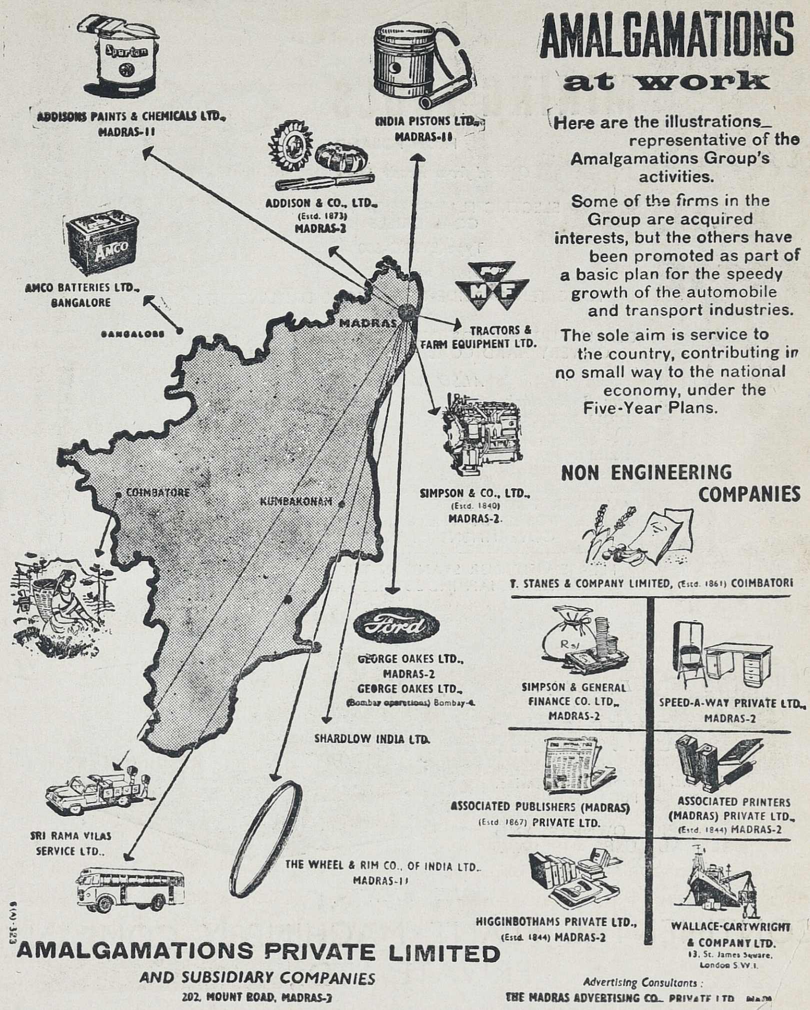

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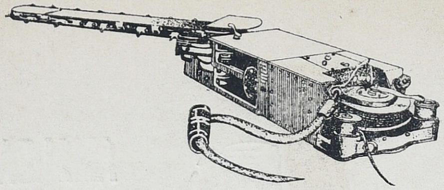

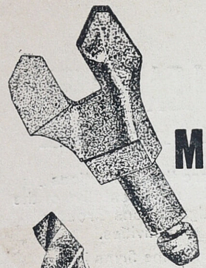

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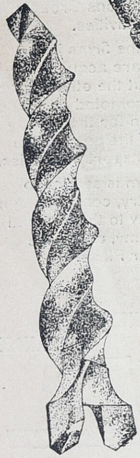

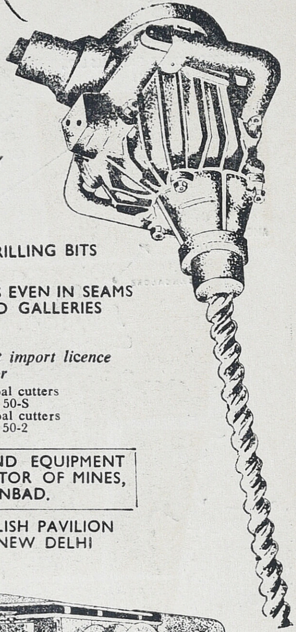

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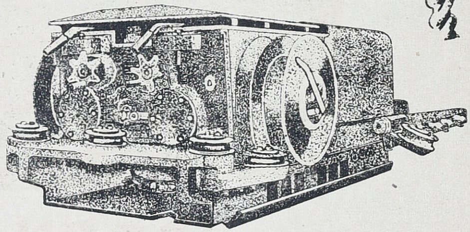

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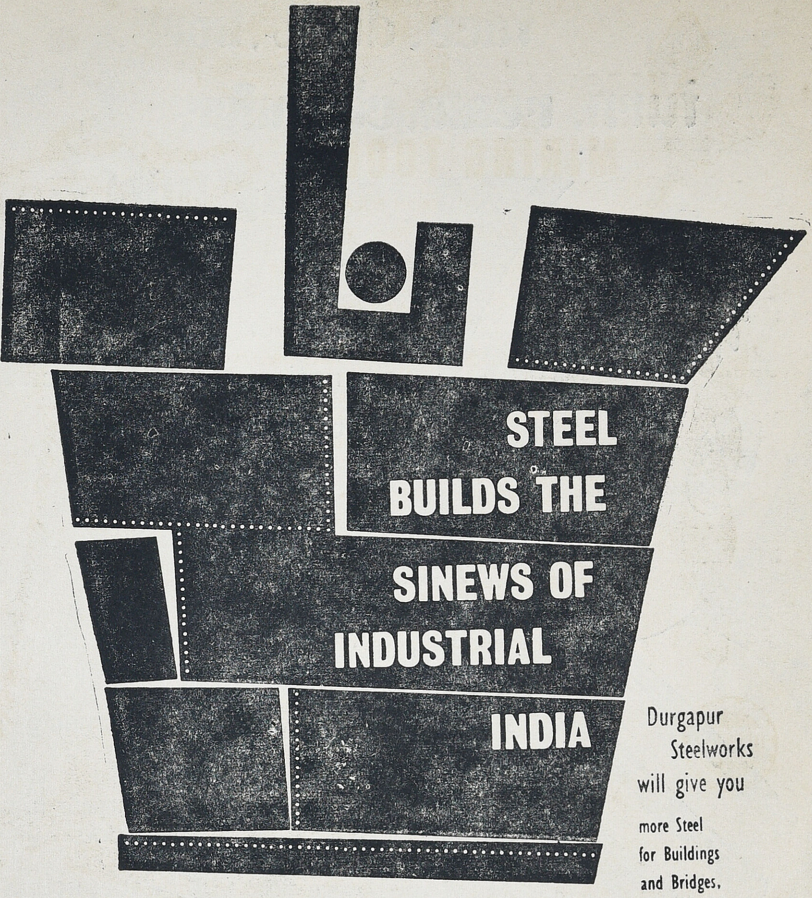

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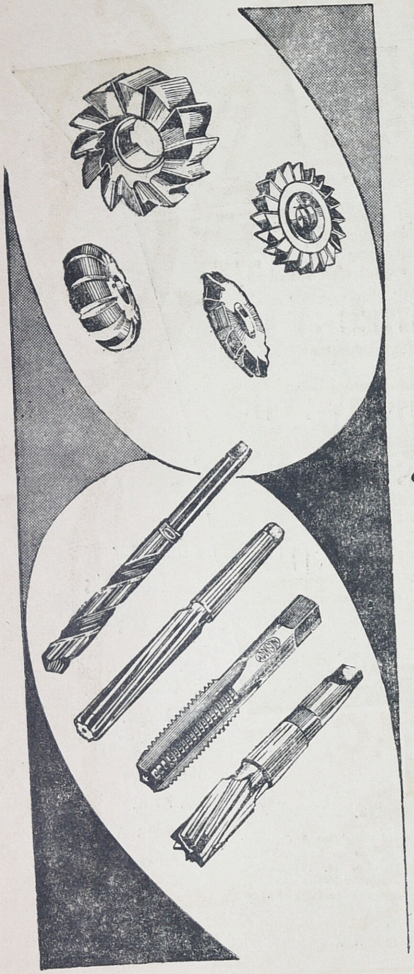

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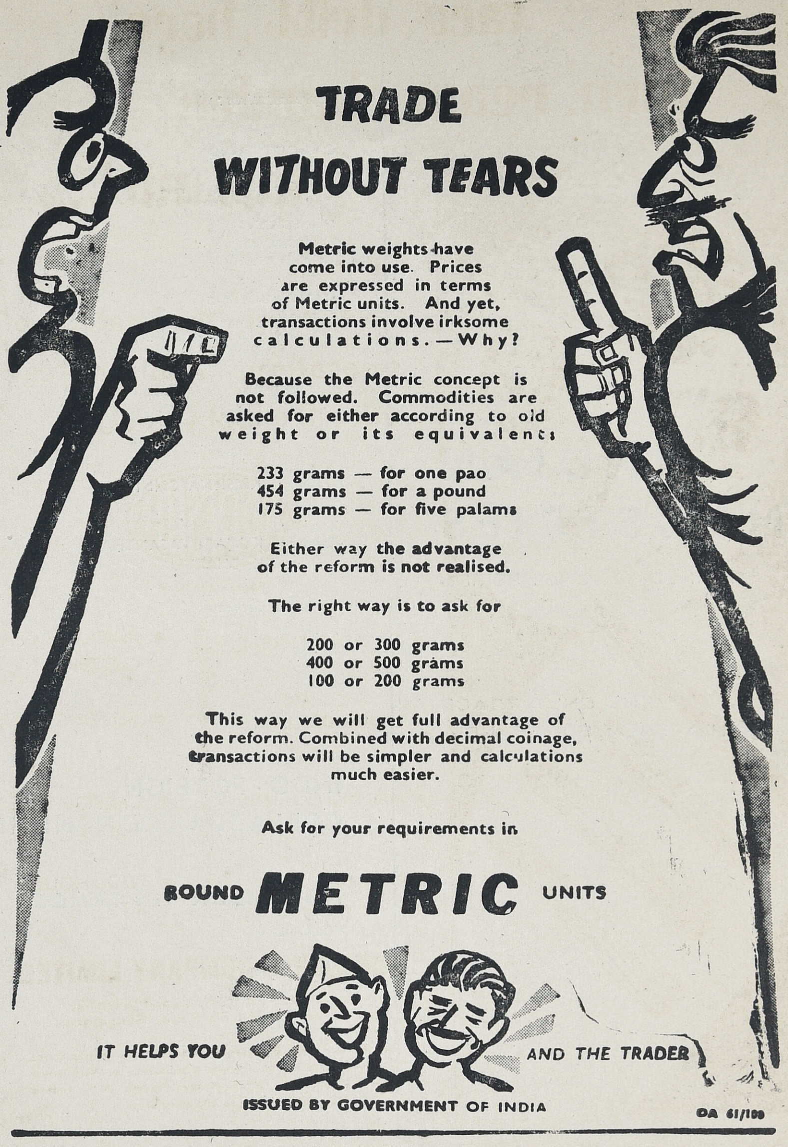
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VOLUME V NUMBER IV

The Editor is pleased to consider contributions of interest to the Indian Industry.

Articles should be accompanied by photographs wherever possible and a stamped addressed envelope should be enclosed for return in the event of unsuitability.

Trade notes and short news paragraphs are always welcome.

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Indo-Foreign Collaborations

Upto 31st March, 1961, India has received Rs. 2,500.5 Crores as foreign aid. Of this about 75% are loans and the rest grants.

Foreign business investment in Private Sector in India was Rs. 611 crores in the beginning of 1960 while it was only Rs. 256 crores in 1948. By 1963, this investment figure is sure to cross a proud four figure, if we take last year's trend in this field as a correct index.

Our most ambitious Third Five Year Plan needs Rs. 2,600 crores from abroad to meet our exchange difficulties.

To be frank, as Prof. P. C. Mahalanobis of our Planning Commission said in London the other day, India needs Rs. 315 crores per annum for the coming couple of decades.

India has reached, very fortunately, that stage of self-generating economy that her requirement of Rs. 6,300 crores of foreign aid spread over a period of 20 years is not asking too much on other nation's generosity and her cry for patronage from lands forlorn will be heard with sympathy and understanding and a glow of feeling that a right deed is done for a right cause.

Americans, Britishers, Canadians, Czech, French, Germans, Japanese, Polish, Russians and others evince a vying interest in collaborating with Indian entrepreneurs in multitudinous projects that, by 1980, India will take her rightful place in the frontrank of industrial glory.

Triumph we will as ages have not withered our will to persist darkest nights.

Krishna Srinivas

Gaseous Annealing of Melleable Castings

C. G. W. OVERTON, B.Sc. (Eng.),
A.M.I. MECH. E., A.M.I.E.E.

Manager, Electric Furnace Dvn. A.E.I., Calcutta-1

Types of Malleable Iron Castings

There are in the main three types of malleable castings in common use :—

1. Standard or Ferritic Blackheart.
2. Pearlitic Blackheart.
3. Whiteheart.

All the three are cast as hard white iron, the as-cast structure consisting of iron carbide and ferrite with no free graphite. The annealing treatment in every case is aimed at eliminating the excess carbide, so making the material ductile, shock resistant and machineable. The annealing method by which this is achieved, however, and the final metallography are different in the three cases.

Gaseous Annealing Process of Malleable Castings

The 'Gaseous Annealing Process' patented and introduced by A.E.I. Birlec Ltd., is perhaps the most modern and quick method of annealing Blackheart and Whiteheart castings. It dispenses with the cans and packing material invariably associated with the older methods, thereby greatly reducing the dead weight within the furnace. The castings are instead placed on suitable supports, and annealed in contact with atmosphere capable of promoting or effecting the desired change, namely graphitisation in the case of blackheart and decarburisation in the case of whiteheart. As a result, an extremely rapid rate of heating and cooling is achieved, which directly reduces the annealing cycle to a fraction of that possible by older methods. The speed and efficiency of heating or cooling are further increased by the special fans which keep the atmosphere within the furnace in vigorous circulation. The atmosphere circulation also ensures uniform heating of the entire charge and in consequence results in outputs free from distortion due to uneven heating.

Gaseous Annealing of Blackheart Castings

The object here is to decompose the combined carbon in the castings to ferrite and graphite without decarburisation. Accordingly an inert and static atmosphere to ensure non-decarburisation is required. This is very simply obtained by allowing the small amount of air within the gas tight furnace to react with the carbon of the castings. The resulting atmosphere containing a mixture of Nitrogen, Carbon monoxide and Carbon dioxide has the required characteristics, and is left within the furnace undisturbed throughout the anneal. In continuous furnaces which cannot be completely sealed a small amount of externally generated atmosphere may be necessary to combat inward air leakage.

The complete annealing cycle comprises of three definite stages, (See Fig. 1 below) starting with (A) controlled preheating followed by (B) final heating to top temperature and soaking for the required time, and finally (C) controlled cooling to the discharge temperature. The duration of the full cycle largely

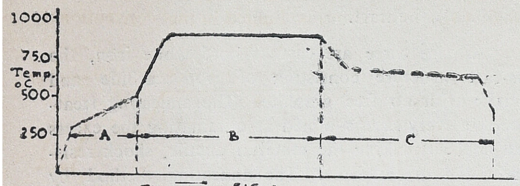

FIG. 1.

depends on the composition of the castings. For normal grades of blackheart the annealing cycle is of the order of 48 hours.

The entire cycle may be carried out in either a single furnace or in two separate furnaces. The twin-furnace scheme, incorporating separate high temperature and low temperature furnaces and three hearths, forms a very economical installation for the production of blackheart castings. It must be noted that the total time for preheating and final controlled cooling both carried out in the low temperature furnace, is approximately equal to the soaking time within the high temperature furnace. In the twin furnace scheme therefore, by correctly manipulating movements over the cycle, to bring the appropriate hearth and furnace together, an output could be obtained every 24 hours. Both the furnaces would be more or less kept in continuous operation, except for the change-over time and consequently furnace utility would be high.

Where financial considerations prohibit the installation of a twin furnace scheme all at once, it is quite possible to achieve it progressively in two stages. The first stage would consist of a single dual temperature furnace in which the entire annealing cycle could be carried out. This could later be supplimented by a high temperature furnace, the first one being converted for low temperature work. The second stage equipment would approximately cost 60—70% of the first stage equipment and would double the output.

The first gaseous annealing equipment to be installed in India was supplied on the above basis, and is of the bell type. This furnace was commissioned and put into operation at a well known foundry in Bombay.

Due to the necessity of closer compositional limits and lower carbon content, the as-cast condition for Blackheart malleables cannot be conveniently made from the cupola. A holding furnace either of the rotary oil fired or electric mains frequency coreless induction type is therefore essential. If, however, the scrap involved contains phosphorous in excess of the permissible limit, obviously a direct arc furnace would have to be used.

Gaseous Annealing of Pearlitic Blackheart Castings

The material has an as-cast structure similar to standard blackheart, but is annealed in such a way as to retain some combined carbon in the final structure, usually in the form of spheroidised carbide.

Continuous furnaces are best suited for the production of Pearlitic Blackheart castings, but the initial cost of such a layout is comparatively high. Batch furnaces could also be employed for this purpose, and have been successfully used. In this case, however, it is very important that provision should exist for rapid initial cooling immediately after the soak, since the final properties largely depend upon it.

Among the few methods available for Pearlitic Blackheart production the following one is perhaps the most economical and suitable for large scale production of standard grades.

Metal of standard blackheart composition may be submitted to an anneal, in which the second stage has been modified and cut short, so as to retain some combined carbon. The required cycle is an shown in the diagram. (Fig. 2)

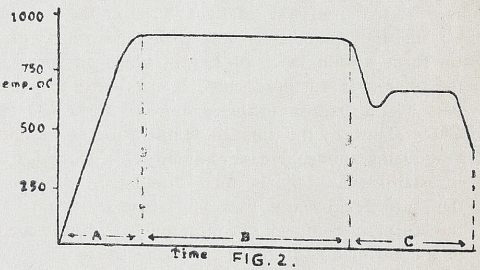

FIG. 2.

As before, stage (A) is that of heating to top temperature. Since second stage graphititisation is to be suppressed, there is no need for retarded heating in the 300°-500°C temperature range which is desireable for standard Blackheart, and heating may be as rapid as is consistent with avoidance of cracking.

Stage (B) is the high temperature soak, as for standard blackheart. On conclusion of this, the castings must be cooled rapidly to well below the

critical range (say to 650°C), and finally reheated to about 700°C for four to six hours to allow spheroidisation of the free carbide (stage (C).) As explained earlier, the initial rapid cooling is all-impôrtant, since final properties are larelgy dependent on it.

The atmosphere requirements are precisely as for standard blackheart.

Geseous Annealing of Whiteheart Castings

In the case of whiteheart castings, since annealing is effected primarily by decarburisation, the atmosphere for gaseous annealing of whiteheart must be strongly decarburising, and considerable quantities are necessary to remove the required 50-70 lbs of carbon per ton of castings. Further, scaling must be avoided, i.e. the atmosphere must not contain free oxygen, and the ratios of H2 : H2° and of CO : CO2 must at one time be less than the equilibrium valves for the oxidation/reduction reactions involved. For the temperature range employed, and allowing a margin of safety, both ratios should be not less than $2\frac{1}{2}$: 1.

There is a wide range of atmosphere compositions satisfying these requirements, which may be generated in many different ways. However, the only practical solution, from the economic aspect, is that in which the atmosphere is derived entirely from reaction of air and/or steam with the carbon content of the castings themselves.

In batch furnaces, the method operates in the following manner. When a new charge of castings is inserted into the gastight furnace, the residual air in the chamber reacts with the iron castings to form a thin layer of oxide, which in turn, as the charge is further heated, reacts with a small part of the carbon in the castings to form CO and CO2. Thus, by the time full temperature is reached, a reducing atmosphere, containing N2, CO and CO2 is established. This is then circulated throughout the furnace, usually by high temperature fans in the furnace roof, and continuously "regenerated" by a controlled addition of air and/or steam.

By regulation of the amount of steam or air added in relation to the amount of carbon available for removal from the castings at any stage of the cycle an atmosphere which is strongly decarburising but non-oxidising may be maintained throughout the soaking period.

The basic cycle is as indicated in the diagram. The heating up to top temperature ((A) in diagram) may be as rapid as is practicable having regard to the size of furnace employed, the only metallurgical limitation being the avoidance of cracking in individual castings, if of complex shape. On batch furnaces, of between 2 and 8 ton net charge capacity, the time may be between 5 and 12 hours according to the size and density of charge and the furnace rating. On continuous furnaces it may be as little as 2 hrs. The top temperature soak ((B) in diagram) is limited in the conventional

- 5 -

A typical whiteheart annealing cycle would be as given below. (Fig. 3)

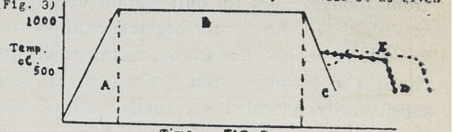

FIG. 3.

ore-annealing proceas to a maximum level of 980° I000°C., since at higher temperatures the ore sticks to the castings. With gaseous annealing processes, however, higher temperature can be used, up to the incipient melting point of 1100°C., being limited only by the necessity of avoiding excessive distortion of the castings. Temperatures in the range 1020°-1060°C., are commonly used.

At a temperature of 1050°C., the required soaking time varies according to the section of the casting, thicker sections requiring more time for an adequate degree of decarburisation and/or graphitisation. Typical soaking times would be :—

Section	Time
Thin—less than 3/16"	30 hrs.
Medium—3/16"—3/8"	45 "
Heavy—over 3/8"	60—80 hrs.

With regard to cooling, thin section castings which have been thoroughly decarburised (residual carbon content 5% or less) may be cooled fairly rapidly at 100°C./hr. or faster, down to a convenient temperature for discharge into air, of 300°-500°C. as indicated by the solid line (C) in the diagram.

On medium or heavy section castings, however, which retain a higher residual carbon content, this treatment would leave the castings too, hard, and the cooling rate must be retarded, to about 5°C./hr., through the critical range of 760°-700°C., as indicated by the dotted line (D) in diagram.

If the best possible combination of tensile strength, ductility and elongation is sought, e.g. to meet the test bar values specified for Grade II of B.S. 309, or if optimum machineability of heavy sections is required, a modified cooling cycle of the "spheroidising" type is necessary. In this case, the castings are cooled as rapidly as possible from

the top temperature to below the critical range, i.e. to 650°-700°C., then reheated to above i.e. to 760°-700°C., and finally cooled again at about 5°/hr through the critical range (line E in diagram). The structure so produced has the combined carbon present as spheroidised carbide, instead of pearlite as in the case of straight cooling.

Practical overall annealing cycles thus vary from about 40 hrs for thin section castings rapidly cooled, to 120 hrs for the heaviest castings requiring an 80 hr soak followed by a spheroidising slow cool. The averge run of castings can be satisfactorily annealed in a total cycle of about 70 hrs.

Equipments for Gaseous Annealing.

Batch Furnaces

In the main there are four types of batch furnaces in normal use, all of which are essentially gas tight chambers with refractory lining to suit the particular application. In every case provision is made for the fitting of a boiler, CO2 recorder etc., to adapt the furnace for whiteheart annealing. The differences between the various types of gaseous annealing plant otherwise lies only in the manner of bringing the hearth and furnace together, and hence in constructional details, from which the different type names are derived.

1. The Elevator Type

A rectangular box shaped furnace with the bottom side open is mounted in a raised position on columns. The hearth moves transversely on rails from the loading station to a position directly below the furnace. It is then elevated into place to close the open side and thus form a gastight furnace chamber.

2. Bell Type

The charge is loaded on a fixed hearth on to which a refractory lined rectangular bell furnace is lowered by means of a crane.

3. Pit Type

A cylindrical or rectangular pit sunk into the ground is lined with refractories and carries the heating elements to form the furnace. The castings are placed in charge baskets and lowered into the pit by a hoist or crane. The floor-level lid is then closed.

4. Bogie Hearth

This is the common type of single ended furnace with bogie moving in and out on rails as required. The door is lifted up vertically to allow the bogie in.

It is also possible to do away with the bogie and just stack the castings in drum containers and place them in the furnace by a charging machine. This has the advantage of reducing the bogie dead weight within the furnace and consequent reduction in the furnace rating is possible.

Continuous Furnaces

These generally are of the straight-through tray-pusher type, in which trays carrying light open containers holding the castings are pushed along one or more paralled tracks through the furnace by means of a pusher mechanism located at the entry end. It is also possible to have other types of conveyors e.g. driven roller hearth, but these are likely to be much greater in first cost as compared to the track and pusher type mentioned above. Continuous furnaces are mostly used for the production of Pearlitic blackheart castings.

Possible Use of Single Installation for Blackheart-Whiteheart

A question is often raised on the possibility of using a single furnace for both whiteheart and black-heart. This is theoretically possible but usually inconvenient in practice. The atmosphere used for whiteheart with water vapour results in a 'wet' furnace and needed extensive drying out before the furnace can be used for Blackheart, even traces of water vapour being harmful for this latter type. The considerable drying time involved in the drying out of course causes much loss of production time.

Relative Properties and Uses

Physical properties of standard blackheart and whiteheart are laid down in British Standards 310: 1958 and 309: 1958 respectively, and are as given below.

No British Standards have yet been issued for pearlite blackheart, but American (A.S.T.M.) specifications list seven grades, ranging in properties from 29 tons in 2 U.T.S. with 10% elongation to 45 tons 2 U.T.S. with 2% elongation, as determined on the standard 9/16" tensile test bar.

B.S.S. No.	Grade, Type, Designation, etc.		Dia. of test bar ins.	Min. Tensile strength tons/sq. in	Yield point tons/sq. in.	Elongation %
•	Grade 1 W'ht.	secns. over 5/16	0.564	22	12	4 on 2"
	,,	secns, 3/15 to 5/16	0.357	20	11	6 on 1.25"
309 (1947)	,,	secns, under 3/16	0.252	20	11	6 on 1.0"
	Grade 2	secns, over 5/16	0.564	24	13	8 on 2.0"
	,,	secns, 3/16 to 5/16	0.357	22	12	10 on 1.25"
	,,	secns, under 3/16	0.252	22	12	12 on 1.0"
	Grade 1 B'ht all sections		0.564	18	10	6 on 2.0"
310 (1947)	Grade 2 ...	... ...	0.564	20	11	10 on 2.0"
	Grade 3 ...	... ...	0.564	22	12	14 on 2.0"

With the regard to uses, whiteheart is generally chosen for light thin section castings such as pipe and conduit fittings, cycle frame parts window fittings etc. Standard blackheart, having more uniform properties and excellent machineability, is preferred for engineering castings, particularly where large scale production is involved as in the motor trade. Many other types of casting can be made satisfactorily in either materials. Pearlitic is useful where high tensile strength with lower, but still acceptable, ductility is indicated. The latter material also has the advantage of a structure suitable for surface hardening by flame or induction methods. The relative usage of pearlitic is rapidly increasing.

Malleable Castings from Indian Raw Materials

The normal pig iron and scrap obtained in India has a phosporous content beyond the permissible limits for malleable castings. It therefore becomes very essential to resort either to a melting equipment in which phosphorous can be eliminated or to careful grading and selection of scrap low in phosphorous level.

In a normal malleablising foundry it is estimated that approximately 50% of the production comes back to the melting unit as foundry returns. Therefore once production is got under way; the foundry is then automatically provided with about 50% of its melting requirements in right specifications from the foundry returns. The remaining 50% will still have to be

(1) From selected scrap, or

(2) From a suitable refining unit.

In case (1), a duplex process involving a cupola as a primary melter and a rotary oil fired or an electric Mains Frequency coreless induction furnace for holding would be quite suitable. But where phosphorous has to be eliminated (case 2), and low grade scrap is concerned, a Direct Arc Furnace appears to be the only practical solution for Indian conditions.

Associated Electrical Industries (India) Private Ltd., Head Office, Calcutta are in a position to supply all types of electric melting furnaces. There is a special point about the direct arc furnaces though, in that, the Government of India have granted A.E.I. (India) Private Ltd., a licence to manufacture 3 and 4 ton Direct Arc Furnaces to their associates' designs. A major portion of these furnaces would be manufactured in India, the remaining few essential parts being imported on a own quota licence. This enables A.E.I. (India) Private Ltd., to offer the above two sizes on a complete rupee basis.

Sizes other than these would still have to be imported, but A.E.I. could arrange for part local manufacture of any size of Direct Arc Furnaces, whereby the customer would have to procure an actual users import licence for the imported parts only.

A.E.I. (India) Private Ltd., will be glad to be favoured with enquiries and to supply any information or assistance which may be required. A specialised and experienced team of engineers hold themselves ready, should any discussions or visits be desired.

***

Glimpses of Railway Development Programmes for Third Plan

Traffic Targets

The Railway development programme in the Third Five Year Plan has been formulated on the basis of the originating traffic reaching a figure of about 245 million tons in 1965–66, i.e., the last year of the Third Plan. The volume of traffic is thus expected to increase over that in 1960–61 by 91 million tons, i.e. by about 59 per cent. A broad break-up of this traffic as between various commodities is indicated in the Table below.

In regard to three basic industries namely, iron and steel, coal and cement, calculations of transport requirements have been made on the basis of the estimated production and the probable location of the production units. The estimate of traffic in respect of steel and the raw materials of steel corresponds to a production target of 8.3 million tons of finished steel and pig iron which includes about one million tons from the Bokaro steel plant. The estimate in respect of coal at 90 million tons corresponds to a production target of 97 million tons, the difference of 7 million tons will move by means of transport other than the railways. The estimate may have to be reviewed when further detailed studies of the likely short distance movements of coal to the washeries have been completed.

As regards traffic in general goods, the estimate provides for 22.5 million tons of railway materials and 11 million tons of iron ore to be moved by rail for export. This last figure includes 4 million tons of iron ore from Bailadilla expected to be reached in 1966. Taking into account the quantity of iron ore to be moved by road to certain minor ports, the total capacity for movement of iron ore for export in 1966 is estimated at about 13 million tons. As regards the rest of the commodities in this group, a careful study was made of the past trends in rail movement with reference to production, imports and exports of some of the more important commodities such as raw cotton, textiles, jute products, salt, paper, sugar and food grains. Altogether, the estimate provides for an additional 11.5 million tons of traffic in respect of commodities other than iron ore for export and the railway's own materials, over the existing level of about 64 million tons carried by the railways or an increase of 18 percent over five years. Over the Second Plan period the traffic in these commodities is estimated to have increased by about 8 million tons, i.e. from 56 million tons in 1955–56 to about 64 million tons in 1960–61.

In respect of passenger traffic, the railway programme provides for an increase of 3 percent per annum in the non-suburban traffic. As regards the suburban traffic, the increase to judge from past experience, is likely to be of a subtantially higher order. The intention is to provide during the peak periods the maximum possible frequency of train services with such marginal increases in line capacity as may be called for.

Railway Development Programme

The cost of the railway development programme as at present formulated, including Rs. 35 crores

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required on stores suspense account, is estimated to be of the order of Rs. 1325 crores. The break-up is as follows :

Railway development programme in the Third Plan :

Programme	(Rs. crores) estimated cost
rolling stock	510
workshops, machinery & Plant	62
track renewal	170
new lines	147
electrification	70
signalling & safety works	25
traffic facilities (line capacity works)	183
bridge works	25
other electrical works	8
other structural works	15
staff quarters and staff welfare	50
users' amenities	15
road services	10
stores suspense	35
Total	1325

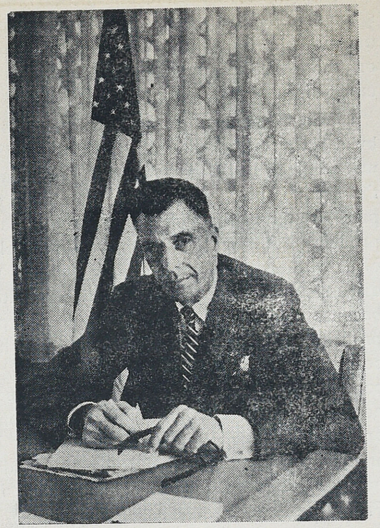
Users' Amenities

Provision for Users' Amenities has been kept at the level of the Second Plan. The programme includes provision for remodelling of stations, retiring rooms, waiting accommodation and refreshment rooms, construction of foot overbridges and improved water supply arrangements, latrines, and bathing facilities, as also provision of electric lights and fans at railways stations. On account of the limited funds available, the schemes in this regard are proposed to be drawn up on austerity standards. The capacity for the manufacture of rolling stock has been substantially increased during the Second Plan period, and all the steam locomotives, coaches, and wagons, required by the Indian Railways are being produced within the country. Complete self-sufficiency has also been achieved in respect of mechanical signalling equipment and the manufacture of electric signalling equipment has been started. Capacity is being created to produce within the country the entire supplies of track materials required by the Indian Railways. To the extent possible, efforts will be made in the Third Plan period to manufacture diesel and electric locomotives and other items of equipment which are still being imported. The requirements of foreign exchange for the railway development programme in the Third Plan are estimated at Rs. 186 crores as against Rs. 332 crores estimated to have been actually spent during the Second Plan period. ***

PATRONISE RAILWAYS — NATIONAL TRANSPORT

In the transport of goods, Railways cannot pick and choose. A cheap commodity like COAL, and an expensive commodity like PIECE GOODS are both accepted and carried. In the interest of all, do utilise to maximum extent the capacity available on Railways — which capacity is being rapidly increased, to enable Railways to serve the nation, better.

(ISSUED BY THE SOUTHERN RAILWAY)



Economic Development in Perspective

JOHN KENNETH GALBRAITH
Ambassador of United States in India

For almost three years India has been represented in the United States by one of its most distinguished jurists, Mr. M. A. C. Chagla. Not long before leaving for India I met him at the Harvard Law School where he was delivering the last of a series of lectures on comparative constitutional law which he has given during his term as ambassador. I told him that I hoped that I might follow his example while in India and speak occasionally on economics. He urged that I do so and we agreed that diplomacy between civilised states should now become a form of educational exchange. In my remarks today I thought I might revert to a subject which has long interested me as a social scientist, that of the process of econ mic development. And in particular I would like to reflect on our current ideas on this subject as compared with those of the great period of English, Western European and American advance which we now think of as having begun two centuries ago and which we call the Industrial Revolution. On later occasions I hope to pursue the discussion. Perhaps, before I have finished, my audiences will think better of the days when diplomats, in the oldest if not the highest tradition of their profession, were concerned only with how to say very little but to say it very well.

II

In the years since World War II, in all parts of the literate world, we have had an exceedingly active discussion of economic development. Although one should always be wary of comparisons, this discussion can be compared in vigor with that which got under way after the publication of Smith's inquiry into *The Nature and Causes of the Wealth of Nations* in 1776 and to which in the following sixty or seventy years Bentham, Malthus and Mill, among others made their notable contribution. The occasion is the same. Of late, as then nations are in the beginning stages of national development. The new countries of Asia and Africa are now concerned, as were those of Western Europe in the latter eighteenth and early nineteenth centuries, to understand the processes on which progress depends. In these last years scholars in the economically more advanced countries have joined, and on occasion have led, the discussion. I am both impressed and made proud by the intensity of the interest in the economics of development in the United States.

Both in the new states and the old states it has been recognised that economic development is an imperative. Indeed this has been a distinguishing feature of the recent as compared with the earlier discussion. At least until the time of Marx, the problem of economic progress was explored with a

measure of philosophical detachment. In the years since World War II it has been characterised by a note of high urgency. The nineteenth century discussion was in a world that, on the whole, was rather proud of what was happening. The twentieth century discussion is in a world where there is a strong feeling that a great deal more must happen and very soon.

The recent discussion of development has also differed from the earlier in being remarkably more sophisticated. We now have growth models—hypotheses as to the nature of the process of economic growth—some of considerable mathematical refinement and a few that are wholly incomprehensible. Capital-output ratios and marginal capital-output ratios are now calculated more or less on a mass production basis for the various components of five, seven and ten year plans and for perspective plans beyond. Missions pass through the underdeveloped countries avoiding each other only by adhering to closely planned schedules and accumulating new information or joyously rediscovering the already known. There is now a considerable sociology and a sizeable anthropology of backwardness. We are told that Mill by the age of seven was the master of the Greek and Latin classics. Were he now to reappear some ninety years after his death he might well decide, after seeing how intricate are the matters on which he once wrote, to stay with Ovid and Cicero.

Yet it would be a mistake to identify complexity with completeness and sophistication with wisdom. There are some serious shortcomings in the modern discussion. And these become evident as we compare it with the earlier debate.

III

It is our pride that the recent discussion of development has been scientific—that terms and concepts have been rigorously defined and so employed that scholars working on different aspects of the problem can communicate with each other with some certainty, can correct each other as necessary and each by adding his piece of knowledge to the common stock can thus add to the total wisdom. The earlier discussion was less precise but more grand. Smith, Malthus, Bentham and Marx were builders of systems; they concerned themselves with the aggregate requirement of progress. The principles of good government, the inducements to individual performance, the role of popular enlightenment, the foundations of thrift, the effect of competition and of monopoly, the relation between social classes, the reasons why some people, notably the English, worked hard and others, notably the Irish, worked not so hard were among the many questions which were grist for their mill. Indeed anything that was deemed to have a bearing on economic advance was considered. The only test was broad relevance to the questions. What made for economic progress? Or on the other hand what led to stagnation to the much-discussed stationery state?

The Nineteeth Century debate was conducted by a rather small number of men. By its nature it was confined to those who could grasp and articulate the great issues. Only great men could thus participate—we have often heard it said that each generation produces but one philosopher. Fortunately for those of us who essay to speak on the subject, the modern discussion has been much more democratic. That is because it has been concerned with the parts of the problem rather than the whole. Men with a usefully cosmic view of society may be scarce. Many can contribute to knowledge of bits and pieces. It may not be easy to elucidate the relation of a philosophical or religious idea to economic change. But almost anyone can come up with some useful ideas on the priority to be attributed to machine tools in the next Five Year Plan.

Here it seems to me lie the weakness and even the dangers of the current discussion of economic development. We have been enthusiastically and quite capably discussing the parts of the problem; we have paused all too infrequently to inquire whether they fit into a viable whole. We have given too little attention to inquiring whether they are being employed in a context that is favorable to development. As a result we have probably wasted a good deal of time and effort doing things that were right in themselves but which made little or no contribution to progress for they were done in an environment which was inconsistent with advance.

IV

Let me be more specific. In the years since World War II, in the absence of any overall consideration of the conditions of economic advance of the kind that was offered a century earlier we have made a series of assumptions. These are:

(1) That the world is divided between developed and underdeveloped countries. In the developed countries economic progress is more or less automatic—or in any case it is easily within the powers of the country itself if it follows an intelligent economic policy. Development is possible in any underdeveloped country. But it will occur only when certain barriers to development are overcome.

(2) These barriers, on which there is a good deal of agreement, are a shortage of modern technical knowledge or know-how, a shortage of capital, a shortage of specially trained manpower and an absenee

of a sound plan for using capital, manpower and technical knowledge. If these are provided there will be progress.

The standard prescription for economic development proceeds directly from this diagnosis. Technical assistance is obtained from abroad. Steps are taken to increase the supply of domestic savings and of capital from both domestic and foreign sources. Men are sent abroad for training. A five year or seven year or ten year plan is devised. These steps will indeed be sound if the diagnosis of the development problem is sound. If that diagnosis is unsound we will be having a good deal of waste motion in the world. It is my unhappy feeling that the diagnosis leaves a great deal to be desired. That it is more nearly valid for India than for most other countries can be of only limited comfort even here in India for the task of overcoming proverty and privation is on that lies on the conscience of all mankind. Let us look more at the present diagnosis in the context of some practical situations.

V

We have said that capital and technical knowledge are the missing elements. But in many of the newer African states national government is still in its beginning stages and in parts of Latin America it has never been brought to a minimal level of efficiency. Under these circumstances investment, whether public or private, is subject to the risks, uncertainties and eccentricities of poor public administration. It is idle to imagine that good development plans can be created or carried out without a good government to do so. And neither technical assistance nor trained technicians do well, or are even much needed, where administration is indifferent or bad. The best agricultural scientist cannot make much headway as adviser to a non-existent ministry. The finest tax authority goes to waste if the minister doesn't believe in collecting taxes. The first task is not to get capital or technicians but, where these are lacking, to build competent organs of public administration.

In the last century nothing occupied a more prominent place among the requirements for economic and social advance than public education and popular enlightenment. In the new states today, or the older ones without developed system of popular education, one wonders if schoolbooks should not come before machine tools. Popular education releases the energies not of the few but of the many. And it opens the way to technical knowledge. Literate people will see the need for getting machines. It is not so clear that machines will see the need for getting literate people to manage them. So under some circumstances at least popular education will have a priority over the dams, factories and other furniture of capital development.

Finally in many countries any serious look at the larger system must soon come to focus on the shortcomings of the social order—on arrangements under which wealth and political power are a monopoly of a small minority of the population and the masses, accordingly, are excluded from all incentives to improvement. Even the most eloquent agricultural extension expert cannot explain the advantage of growing two grains of wheat where but one flourished before if the peasant knows full well that both grains will go to his landlord. The best-considered forms of agricultural investment or the most sophisticated techniques of agricultural extension are worthless if the cultivator knows that none of the gains will accrue to him.

In short, on even the most preliminary view of the problem effective government, education, and social justice emerge as critically important. In many countries, in diagnosing the barriers to advance, it is lack of these that is of critical importance. And it follows that until these barriers are removed little will come from capital investment and technical assistance. And while there may be plans they will be big on paper and small in practical result.

VI

I have said that the present diagnosis of the causes of underdevelopment with its strees on capital, technical assistance and planning does not fit India too badly. India has an effective government; there is a substantial measure of literacy; she has a backlog of administrative and entrepreneurial talent; there is a solid commitment to the goals of social justice and social progress. At the same time the propensity to consume is high and the rate of saving is low and the problem of capital supply is especially serious for that part which must be obtained from abroad. Under these circumstances attention has naturally been focussed above all on the question of financial support to investment.

We have here an important reason for our misapprehension of the problem of development. India is by far the largest and most populous of the underdeveloped countries, China apart. Her development has attracted more attention than that of any other country partly because it has the most competent planners, and the most articulate journalists. Despite their shortcomings India also has the best statistics and, as we economists know, it is difficult to mount much of a discussion of development of a country

where even imaginary gross national product data are unavailable. As a result the world has come, in far greater degree than has been realized, to identify development as a whole with the experience of India. Since capital and technically trained man-power are the limiting factors in India they are assumed to be the limiting factor everywhere. Since competent planning is possible in India it is assumed to be possible everywhere.

I think, however, that we in the United States have been responsible for some of the over-emphasis on capital and technical know-how and talent. As a nation we have a healthy respect for money and its uses. And in the United States economic accomplishment depends not on the changing will of the government, not on winning the right social climate, not on finding literate workers for these are taken for granted. Accomplishment depends on finding the capital and recruiting the engineers, scientists and technicians. The world in short has generalised from the Indian experience and we have generalised from our own. Those who praise the cooperation between our two countries should observe that is extends even to misleading students of economic development.

VII

What is the lesson? It is not that capital or technical assistance or technical training are unimportant or that planning is a waste of time. India, where these are vitally important, is competent proof to the contrary. The lesson is that we can no longer have one diagnosis of the causes of underdevelopment. Rather we must have the particular diagnosis which fits the particular country. And in few cases will the causes of backwardness or the requirements of progress be quite the same.

More specifically we must recognize that economic development is a process—one that extends in range from new nations of Africa but slightly removed from their tribal structure to the elaborate economic and social apparatus of western nations. At each stage along this continuum there is an appropriate policy for further advance. What is appropriate at one stage is wrong at another.

In the early stages it undoubtedly involves the building of organs of public administration and the provision of an educated minority. Then comes the task of popular enlightenment. As one proceeds along the line other requirements enter and depending on population and resource endowment these will be different in different countries. Capital becomes the touchstone of development only in countries that are well along the line. At all stages the social structure must be favorable for development. Development is a democratic task. It will proceed only if the masses are enlisted and they can be enlisted only if they are rewarded. The world offers a number of strifling examples of nations rich in minerals or oil and where as a result capital is in adequate supply but where the social structure remains a barrier to advance.

Because the requirements for development will be radically different depending on the stage, any effort to offer a common prescription for development will be productive only of waste, frustration and disappointment. And so, likewise, will be generalization from the experience of a country in one stage of development to the needs of a country in another stage. To generalize from the experience of the United States to the needs of India will be productive of error but so, equally, will generalization from the case of India to that of Dahomey or Chad.

I venture also to suggest that as a country such as India moves along the line of development its diagnosis of its development problem will change. It would be a misfortune were habit and doctrine, those ever present enemies of thought, to keep the diagnosis from accommodating itself to advance. Thus in the years ahead technical assistance from abroad will be far less important than in the recent past. Increasingly India will be able to import the technology without the technicians.

While capital will continue to be central to India's requirements, I venture to think that you are reaching the stage where the problem of increasing the size of the capital plant will be no more important than to increase the efficiency of its use. In building a steel industry the first stage is to get the blast furnaces, open hearths and converters, and rolling mills. Nothing else is so important. But at the next stage it becomes important that these provide steel at low cost to consumers at home and to nurture exports abroad. And it is even more important that by their efficiency and earnings the plants provide the wherewithal to roproduce themselves. To look at development as a movement along a line is to protect one's self from a stereotyped diagnosis even within the country.

VIII

It would be much easier were there a common formula for economic development and were it to remain constant for the country. But it were better that we face our difficulties including the shortage of handbooks on the ways to create good organs of public administrtion in nations which are unlearned in the arts of self-government or blueprints on how to have the right kind of social revolution without the wrong kind of violence. This may be a more difficult and pessimistic view of the problem than is commonly offered in our day. But we can remind ourselves of Voltaire's observation that "Optimism is the madness of maintaining that everything is right when it is wrong". ***

U. K. Aid to India's Economic Development

To the traditional and well-known links between British private industry and finance and India, which as this article shows later, multiply and diversify annually, there has been added in the last few years considerable direct lending by the British Government to the Indian Government, especially in support of India's public development programmes. The latest important episode under this head, is, in fact, only a few months old.

At the recent Aid India meeting in Washington, the British Government announced a substantial contribution to the external financing scheme for launching the Third Plan. The sum was £89 million (Rs. 118.7 crores)—by far the largest single sum ever lent by the United Kingdom to another country for development. In order to get this financing off to a quick start, arrangements had earlier been made with the Government of India for the signing of two formal agreements covering £40 million (Rs. 53.3 crores) of this new money earlier than the Aid India meeting. These agreements were signed in New Delhi on the 1st May last. The first of them was for a development loan for £30 million (Rs. 40 crores)—covering both the finance for a number of high priority projects and for a shopping list of miscellaneous items essential to India's economic expansion. The second agreement covered a sum of £10 million (Rs. 13.3 crores) for the purchase of a broad range of goods from the U.K.—a type of import often referred to as " maintenance imports ".

In addition, talks are already well advanced on the financing by Britain of the foreign exchange costs of the extension to the great Durgapur steel plant. Negotiations will be joined later on the purposes for which the balance of the £89 million (Rs. 118.7 crores) committed by Britain to help India's development, will be used.

Second Plan Loans

These new loans follow on the large sums lent to India for the Second Plan which amounted in all to £80.5 million (Rs. 107.3 crores) as the following table shows :—

	£ million	Rs. crores
1958 for Durgapur steel works	15	20
1958 for general imports	28.5	38
1959 for Assam pipeline	3	4
1959 for general imports	19	25.33
1960 for general imports	10	13.33
1960 for general imports	5	6.67

Besides these loans, a sum of £22 million (Rs. 29.3 crores) representing various advance repayments by the U.K. of surplus pension funds was paid during the Second Plan. Another sum of £1.7 million (Rs. 2.2 crores), in respect of the British Technical Assistance programme was disbursed to India during the period 1951–60.

The warmth of British interest in India's economic aspirations is demonstrated both by the quantity of aid made available in spite of recurrent anxieties in Britain about her own balance of payments position, and by two other features. The *first* of these is the appreciation that India needs general assistance not linked to projects so that she can maintain a balanced move forward in her economic expansion. The *second* is the progressive lengthening of the repayment terms of U.K. loans in order to mitigate the burden of debt servicing on India. For instance, the £30 million (Rs. 40 crores) loan agreement signed earlier this year carries, to begin with, a seven-year grace period when no repayments are called for, and is not finally repayable for 25 years—in other words the last payment will be made in 1986 which may well be the last year of the seventh Five Year Plan! In these matters, Britain has been well to the fore among friendly nations in appreciating the special character of Indian needs in the sphere of development finance.

Colombo Plan Aid

Britain is the second largest contributor of aid under the Colombo Plan. This Plan is designed to assist the developing countries of South and South-East Asia, and in the year ended June 1960, Britain's annual rate of capital expenditure for development purposes had risen to £44.5 million (Rs 59.3 crores). Since 1951, when the Plan was launched, until 1960 Britain's commitments for development by way of capital aid and technical assistance totalled £170.7 million (Rs. 227 crores).

Under the Technical Co-operation Scheme training facilities have been provided in the U.K. for over 4,000 men and women. Of these 1,110 went from India, and cost Britain £0.82 million (Rs. 1.1 crores). In addition the Scheme has also sent to India experts and equipment at a cost of £0.87 million (Rs. 1.16 crores).

Durgapur Steelworks

The Durgapur Steelworks, with an output of one million tons of ingot steel a year, is an impressive landmark in India's industrial progress and a dramatic example of Indo-British co-operation. A consortium of 13 British engineering companies banded together under the title of ISCON (The Indian Steelworks Construction Company) to carry out the biggest single overseas engineering project ever planned by the United Kingdom. Out of the final cost of about £104 million (Rs. 138.7 crores) sterling expenditure accounts for at least £70 million (Rs. 93.3 crores). To help meet this call on foreign exchange the U.K. Government lent to India £15 million (Rs. 20 crores) and London banking houses have provided a further £11 million (Rs. 15.3 crores).

The contract for the project was signed in October 1956 and such has been the speed of progress that the fourth and final stage of constructing this complex plant is already nearing completion and should have been completed by the time this article is in print.

A plan to expand the capacity of the plant up to 1.6 million tons of ingot steel a year has been approved. The cost of the expansion is estimated at £42 million (Rs. 56 crores) and the U.K. Government is to provide a loan of £20 million (Rs. 26.7 crores) towards the foreign exchange element.

Britain has also provided training facilities for 400 of Durgapur's future supervisory staff and technicians and over 200 of the 358 men selected have finished their training in Britain and are now at work at Durgapur.

Heavy Electrical Plant

Another important project in the public sector built with U.K. collaboration is the heavy electrical plant factory at Bhopal. This factory was opened in November 1960 and will eventually supply the bulk of India's needs for heavy electrical equipment. Associated Electrical Industries Limited of Great Britain, who have been technical consultants for the project since its inception, will continue to work closely with the Government of India in running the factory.

The first step was the construction and equipping of a large training school and workshop, undoubtedly the largest and best equipped in India (and ranking high even by world standards), where some 3,000 artisans and engineers of all grades are now being trained. In addition, other experienced engineers are being sent for extended training course, some for as long as three years, to the British factories of Associated Electrical Industries.

Target Redoubled

Side by side with this training programme, work has been vigorously pushed on with the construction of the factory. The output target for the factory was originally Rs. 12.5 crores per annum, but this was raised progressively to Rs. 25 crores. This target

is expected to be reached by the end of the Third Five Year Plan and raised later to Rs. 50 crores, a target which will be reached during the Fourth Five-Year Plan. The maximum size of generators and transformers planned has also been increased from the original 50,000 kw to 1,50,000 kw in view of the latest assessment of India's needs.

Private Investments

Since Independence, Britain's private investment in India has more than doubled itself. It constitutes more than 75 per cent of all foreign private investment. In 1948, United Kingdom capital invested in India totalled Rs. 206 crores. In 1959, out of the total foreign investment of Rs. 528 crores, United Kingdom invested capital amounted to Rs. 400 crores. This represents an average increase of Rs. 18 crores a year.

Some of the best known names in United Kingdom industry are now investing in India and the number of such new enterprises and joint ventures continue to increase.

Chemicals

Imperial Chemical Industries Limited have many interests in India and among notable developments was the first commercial explosives plant built in Bihar as a joint enterprise by I.C.I. and the Government of India.

At Rishra, in West Bengal, in May 1960, India's first polythene plant was opened. This project cost Rs. 4 crores, has an annual capacity of 3,500 tons. It was built by an ICI subsidiary, the Alkali & Chemical Corporation of India Limited, is based on alcohol obtained from molasses and will save India Rs. 1.5 crores a year in foreign exchange on imports. The same Corporation is also to build a rubber chemical plant at Rishra.

Road Transport

Instances of Indo-British co-operation in road transport include the motor car manufacturing agreement between Hindustan Motors Limited and the British Motor Corporation, and the agreement between Standard Motor Products of India Limited, Madras, and the Standard Motor Company of Coventry. In addition, Ashok Leyland Limited of Madras are associated with Leyland Motors Limited of Lancashire, in the production of lorry and bus chassis, and have already exported 24 Comet chassis to Ceylon. By early 1962 all the castings for Ashok Leyland Ltd. will be produced by Ennore Foundries Private Ltd., another company in which Leyland Motors Ltd. have a large interest and investment.

Joseph Lucas Ltd. have a large investment in a new company formed to undertake the manufacture of all types of electrical equipment

Many of the bicycles in use in India carry familiar British names. The "Hercules" bicycle is produced in the Madras factory of T. I. Cycles of India Limited, which is associated with the Tube Investments Limited, and the Hercules Cycle & Motor Cycle Co. Limited, both of Birmingham. Since 1952, the "Raleigh" has been manufactured at the Asansol factory of Sen Raleigh Industries Limited, in association with the Raleigh Cycle Co. Ltd. of Nottingham. Tube Products of India Ltd. in association with Tube Products Limited, Oldbury, produce steel tubes at their Avadi plant for the cycle industry.

The Enfield Cycle Co. Ltd., Redditch, through their associates Enfield India Limited, are producing motor cycles at a plant in Madras at the rate of 5,000 machines a year.

Dunlops are another well-known British company actively engaged in new projects. In February 1959, their new tyre factory at Ambattur began production of tyres for lorries, buses and bicycles, and they have plans for a collaboration venture with an Indian company to produce truck wheels and rims in Madras.

Electrical Goods

In the electrical field, machinery of various types is being manufactured by AEI Manufacturing Company Private Limited of Calcutta, an Indian subsidiary of Associated Electrical Industries.

The English Electric Company Limited is putting up the whole of the Rs. 40 lakhs for the manufacture of low voltage switch and fuse distribution equipment in Madras.

W.T. Henley's Telgraph Works Company Limited, in cooperation with Henley's Cables (India) Limited, is putting up 60 per cent. of the Rs. 1.1 crores capital required for an electric wire and cable factory in Bombay.

The Automatic Telephone and Electric Company (India) Private Ltd. with its factory in Bangalore, was the first major concern of its kind to be set up by the Government of India with foreign collaboration after Independence and is generally regarded as one of the most successful examples of Indo-British collaboration.

Heavy Machinery

There is a large-scale project at Durgapur for the manufacture of heavy machinery for cement

plant, coal mining equipment, boilers, pressure vessels and similar items. This plant, which is expected to be in production by 1962, is to be established by a new company, A.C.C. Vickers-Babcock Ltd., in which two leading United Kingdom companies, Vickers Armstrong and Babcock & Wilcox are collaborating with Associated Cement Companies of India (these three firms together holding 98% of the total capital, the remaining 2% invested is held by Indian firms). The United Kingdom share of the finance to be subscribed in the first three years is likely to amount to over Rs. 2.5 crores.

Consolidated Pneumatic Tool Company Limited has invested Rs. 0.15 crores to manufacture pneumatic tools and air compressors at Mulund, Bombay.

Other Schemes

During 1960 eighty new collaboration schemes with U. K. firms were approved by Government of India and another thirty were approved during the first quarter of 1961.

A factory for the manufacture of cold rolled steel strip is to be set up in Bombay. The project has been sponsored by Graham Firth Steel Products (India) Private Ltd., a new company formed by Indian interests in collaboration with Graham Firth Steel Products Limited of Walsall, England. One-third of the capital outlay of the project will be subscribed by the British company and the remainder by the Indian participants. The contribution of the British company will take the form of complete plant, machinery, tools and other equipment and technical advice. The collaboration agreement does not invole any payment of royalty and the new company has the right to use the "Firsteel" trade mark of the parent company. The factory will have a final capacity of 25,000 tons of finished steel strip a year.

Three Scottish firms formed a Rs. 10 lakhs syndicate to establish and operate a factory to produce paper-making machinery at Calcutta. The firms are Bertrams Limited, Ernest Scott & Co., and James Bertram & Sons Ltd. A former jute mill was converted for the project and will be in production shortly. Initially a staff of Scottish technicians will train local workers.

A well-known British engineering firm, Head, Wrightson & Co. Ltd. of Thornaby-on-Tees, County Durham, which has had close links with India for many years is forming a new subsidiary with adminstrative headquarters in Calcutta. It has been announced that the new company will trade under the name of Head, Wrightson India Limited, and will act as contracting company for the supply—as far as possible from Indian sources—of various types of plant to the designs of the parent company.

The Glamorgan (Wales) firm of P. Leiner & Sons—whose factory at Treforest is the largest single British producer of gelatins—is establishing a factory at Nagpur in association with Kapurthala & Northern Indian Tanneries (KNIT), of Kapurthala. The new company will be known as the Leiner-KNIT Gelatine Co. Limited. The authorised capital of Rs. 50 lakhs will be held jointly by the two companies.

The heavy engineering firm of John Thompson Limited of Wolverhampton, Staffordshire, has entered into an agreement with the Indian Sugar & General Engineering Corporation for the manufacture of some of its major products in India. The agreement provides for erection at the Indian corporation's Punjab Works of a new plate shop capable of carrying out welding to Class 1 specification.

There is participation to the extent of 70 per cent. by Messrs. Fisons Limited of the United Kingdom (the principals of Messrs. Bengers Laboratories Limited, U.K.), in a collaborative venture with Bengers Laboratories (India) Private Limited, covering all aspects of the manufacture and packing of Dextran B.P. and Iron Dextron. (Pharmaceuticals).

Horlicks Limited have provided 84 per cent. of the Rs. 0.12 crores for a factory for the manufacture of powdered milk at Nabha, Punjab, which was opened on 10th November 1960.

There is a technical collaboration agreement between Twyford Limited (U.K.) and Hindustan Twyfords Limited for the manufacture of sanitary-ware and household ceramics.

Isaac Holden & Sons Limited of Bradford are collaborating in the establishment of a wool-combing plant in West Bengal with an annual capacity of 10 million lbs.

Gannon Norton Metal & Diamond Dies Ltd., Bombay—a joint venture of Gannon Dunkerley & Co. Ltd., Bombay, and Wire Drawing Dies (Manchester) Ltd.—has been formed to manufacture wire drawing dies of tungsten carbide and diamonds. Wire Drawing Dies is a subsidiary of the British firm Sir James Farmer Norton & Co. Ltd. The plant is expected to manufacture dies to the value of about Rs. 7,20,000 a year, which would help in saving foreign exchange to the extent of some Rs. 5,30,000 annually.

Bookers, a leading British industrial group, have announced the incorporation of a company in India in partnership with the Sawhney organisation. The company will set up a heavy engineering works to manufacture sugar machinery and industrial process turbines.

Boots Pure Drug Co. Ltd. are to undertake the manufacture of insulin in collaboration with an Indian firm.

Among other well-known firms who have recently had schemes approved are the following:—

Molins Machine Co. Ltd. (cigarette nnd tobacco-making machinery).

Spencer (Melksham) Ltd. (conveyors).

Wild Barfield Electric Furnace Co. Ltd. (furnaces).

Mirlees Watson & Co. Ltd. (Sugar machinery).

Holman Brothers Ltd. (air compressors).

Third Plan Requirements

The examples instanced of Indo-British co-operation are just a few of the many taking place throughout India, and the range of goods covered is very wide. "Making it together" is a broadly based operation, contributing an important part to India's economic structure in terms of goods, foreign exchange and technical know-how.

The size and scope of India's Third Five-Year Plan will demand a major effort to raise the resources needed to carry it out. The requirements of foreign exchange will be considerable. Most of this will doubtless come in the form of Government loans or credits, or from other international funds of one kind or another. But there is a limit to such assistance. It is now generally acknowledged that India must also attract an increasing volume of private investment and earn more exchange by export.

Scholarship Schemes

Private investment from overseas means a living, creative relationship between the industries of other countries and India; and there is no doubt that in this partnership for progress and prosperity, British industry will continue to play a leading part. This relationship is further strengthened by the training facilities and scholarships offered to Indian engineers and technologists by several U.K. industrial concerns.

The Federation of British Industries scholarship scheme, which provides for practical training with U.K. engineering firms for graduate engineers from developing countries, has steadily expanded since it began in 1950, and India has been one of the major beneficiaries. This is in addition to over a thousand Indians sent to the U.K. for training of one sort or another under the Colombo Plan. Leading British firms such as Burmah-Shell, Imperial Tobacco, as well as Lever Brothers, have also sponsored scholarship schemes for providing opportunities for Indians to go to Britain for post-graduate training.

Developments in the oil Industry

Work was started in November on what is described as one of the largest pipelines in the world, the 720-mile lime from oilfields at Nahorkatiya and Moran, in Assam, to the projected refineries at Nunmati, in Central Assam, and Barauni, in Bihar. The pipeline, which is expected to be completed early in 1962, is being laid by Oil India (Private) Ltd. This company, owned jointly by a U.K. firm, the Burmah Oil Co. Limited, and the Indian Government, now operates on a fifty/fifty basis following an agreement signed early in June 1961. The cost of the project is estimated £ 33·5 million (Rs. 44·6 crores) towards which loans totalling £ 20 million (Rs. 26·7 crores) have been made by the Burmah Oil Company and a £ 3 million (Rs. 4 crores) credit has been provided by the United Kingdom Government.

Stewarts & Lloyds Limited will supply about 31,000 tons of 16-inch pipelines, valued at £ 1·9 million (Rs. 2·5 crores), for the first stage of construction—the 260-mile link between the Nahorkatiya oilfields and the Nunmati refinery. W.H. Allen Sons & Co. Limited will supply 51 engines (£ 600,000—Rs. 80 lakhs)—20 for pumping duties in 9 stations, and 21 for power generation in 7 power stations. The order includes diesel engines, dual-fuel engines (to run on oil or natural gas), and diesel engine-driven generating sets with associated switchgear. A subcontract valued at £ 60,000 (Rs. 8 lakhs) for control equipment for the 7 power stations has been placed with Brookhirst Igranic Limited.

Murphy Radio Co. Ltd. will supply £ 1·2 million (Rs. 1·6 crores) worth of radio equipment to provide the control headquarters of Oil India (Private) Limited in Nunmati, with telemetering facilities, ensuring a constant check on oil flow output along the pipeline. This includes £ 130,000 (Rs. 17 lakhs) worth of carrer transmission equipment from Electrical Industries Telecommunications Division and control instruments worth £ 300,000 (Rs. 40 lakhs) from Honeywell Controls Co. Ltd.

* * *

India and Germany

Dr. PETER VON SIEMENS
Chief Delegate of the German Industry for the Indian Industries Fair, New Delhi

Dr. H. I. VON MERKATZ
German Federal Minister

When India announced her decision to hold another Industrial Fair at New Delhi, it was a matter of course for the Gorman Industry to participate. The good results derived from our participation at the last Fair in 1955 would by themselves have been inducement enough to face in India once again the field of our international competitors. There was, however, one further important reason. During the past six years-during which India has achieved remarkable industrial progress-the economic ties between our two countries have become so close that they further induced us to pay very special attention to this Fair. This is a fact, and a very gratifying one at that, as it confirms the confidence which we always placed in India and in the men guiding her economic destinies.

Aside from purely commercial aspects, industrial fairs are an ideal medium to spread instructive information not only on latest technical developments achieved in all parts of the world but also on time-tested and proven engineering concepts and techniques. At the same time they raise and promote widespread general interest in engineering, a very desirable feature in countries which are about to build up their own national industries.

Experience shows that industrialization starts with the planning and erection of well-designed factories, but that it does not end there. To be truly successful it has to be seen to it that the newly erected factories are also kept going and that they fit into the industrial and commercial fabric of the country as a whole. In addition to solving purely technical tasks, an up-to-date technical economy has to devote itself also to the solution of problems pertaining to the commercial, financial, administrative, managerial and social spheres. The training of personnel capable of coping with these tasks therefore assumes equal importance as the training of engineers and technicians.

From experience gathered in the recent past and in connection with a number of joint Indo-German enterprises we are aware of the impact of modern engineering on the traditional ways of life in India and the many social and psychological problems which the planners of India have to face in this connection. Ancient customs have to be given up in favour of new ways of life—often at short notice. What used to be a rustic countryside yesterday, suddenly became the bustling industrial site of today. Newbearings have to be taken. As far as the individual experience of the German industry is concerned, we feel justified in testifying that the Indian mind—despite the great importance it is said to attach to non-materialistic values—is by itself fully prepared and willing to also absorb those properties and qualities which are considered essential in the building up of an industrial economy. The process of absorbing these qualities will be accomplished all the smoother, the better the technical training

imparted to people engaged in industry and the wider their general technical understanding.

We feel that this special aspect—the aspect of imparting technical teaching and training—deserves particular attention. The German industry is keenly aware of its responsibilities in this respect and the part it has to play in order to be of real assistance tô India. In the past several thousands of Indian technicians and students have already been trained in German factories and universities and many more are going to be trained there. These contributions are proceeding hand in hand with those of the German Government, for example, in the shape of the Training Schools as in Madras, the Prototype Workshop in Okhla, Government stipends and scholarships.

We of the German Industry will continue in our efforts in this direction even though, due to a continuing economic boom experienced in post-war Germany, we ourselves are at present experiencing an acute shortage of specialised personnel in all technical fields. This shortage became more evident after 1956 when Germany's wartime recovery may be considered to have been completed, and when real expansion started in connection with sharply increasing orders from abroad.

We do, however, hope to be able to pass on the technical experience gained by us, in the shape of an ever-increasing number of Indo-German joint ventures. These ventures will in turn help to build up a number of small-scale industries, the development of which is of particular importance to the Indian economy. Furthermore, German industrial undertakings with an own organization in India all maintain their individual training centres in this country as well as in Germany, thus again contributing to the training of young Indian talent. There are, in fact, at this very moment some 2000 Indian trainees and students in Germany and it is hoped that this contribution on our part will effectively supplement India's own great efforts in organizing industrial training.

The home consumption of India's population—which statistics show to be increasing at the rate of 2% per year—is so big that essential imports—at least for the time being—cannot be financed by an equivalent volume of exports. The Government of Germany is aware of these difficulties and is trying to remedy them by way of liberal credits.

In this connection, I may be allowed to mention that Germany has already earmarked credits amounting to 425 million dollars (or about 210 crores of rupees) for the implementation of India's Third Five Year Plan. This in no way mean sum may be taken as further evidence of the confidence Germany is placing in her economic partner India. As to exports, we are glad to notice that India has started to offer on international markets an ever-increasing range of finished and semi-finished products. We greatly welcome this development as it will straight away effect India's balance of trade and as it also offers the best guarantees for a steadily increasing growth of trade in the future.

Experience shows that the exchange of goods becomes more balanced as industrialization progresses. Capital goods investments result in an increased purchasing power which, in turn, is beneficial for the consumer goods industries.

To stimulate this growth of trade in both direction is also the aim of those German industries which are participating in the Industries Fair here in Delhi. A good number of reputed firms are displaying their products on a total area of some 80,000 square feet. Representative examples of equipment shown here are pointing to new ways of further fruitful cooperation in addition to those joint ventures which have already been established.

The exhibiting firms represent a wide range of industrial branches. Firms representing the steel industry and structural engineering are exhibiting alongside firms producing motor cars and locomotives. The heavy machinery industry and the electrical industry are displaying products covering mining, ship-building, textile engineering, wood-working industry, machine tools as well as agricultural implements. The chemical and pharmaceutical industries are well represented and so are industries producing precision instruments and optical equipment. As you will be able to judge by yourselves, a wide spectrum of German industrial firms is thus represented at this Fair.

All these firms have one common aim: namely to further strengthen the ties of friendship with India. I very sincerely hope that their wish will be granted and that the Fair will be a very successful one—with benefits accuring to both visitors and exhibitors alike.

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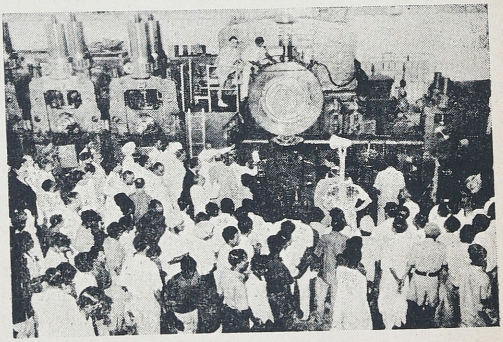
First Indian-made Pipeline Joints Produced in Rourkela's Pipe Welding Plant

Dr. J. W. STROBL
New Delhi

India, displaying admirable zeal in striving to improve the material foundations of her national life, has once again taken an important step forward in its technological development. In Rourkela, where the new steel centre built by the W-German industry amidst jungles and rice fields was inaugurated earlier this year, the pipe welding plant built in "turn-key" fashion by the W-German firm MANNESMANN-MEER AG is already producing steel pipes of large diameter.

Iron, molten from Indian ore with the help of coke from Indian coal, transformed into steel and rolled into broad strip, is the basic material for this ultra-modern pipe manufacturing plant. This plant, to start with, puts India into a position where she can now domestically manufacture the bulk of the steel pipe for the highly important pipeline that will stretch nearly halfway across the entire country from East to West. This project alone, which without the Rourkela pipe plant would have necessitated the importation of finished pipe from abroad, will save the Indian economy enough foreign exchange to amortize the costs of the entire pipe welding plant in Rourkela.

It was a solemn moment, therefore, when the first large-diameter pipe "made in India" and destined for the above purpose was hoisted up by the loading crane from the pipe storage yard in Rourkela and deposited amidst cheers onto the first car of the



waiting transport train. And it was not long before the entire train was loaded and departed for Digboi near the Burmese border. This town in the north-eastern corner of the province of Assam is the starting

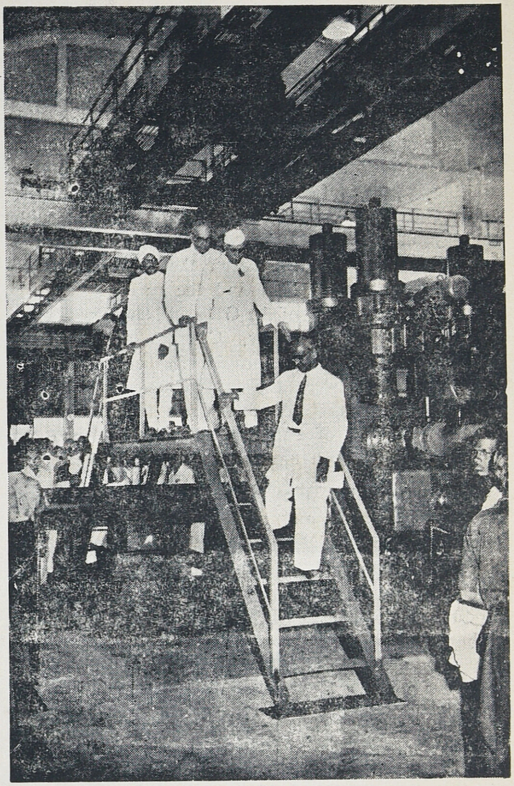
point of the pipeline that is being laid by the MANNESMANN-SAIPEM group and which, over a distance of more than 700 miles (1.140 km), will link the rich oil fields in that border region with the projected large refinery at Barauni in the province of Bihar, northwest of Calcutta.

When Rourkela's large-diameter pipe welding plant was completed on schedule (Sept. 1960) within a record 15 months, this fact caused a veritable sensation. Manufacturing processes in use there are characterised by complete mechanisation and by far-reaching automation, with widest possible use being made of the experiences gathered at the MANNESMANN-HOESCH large-diameter pipe works in Germany.

Most of the Indian engineers and technicians who now run the plant in Rourkela were trained at the MANNESMANN-MEER workshops in Moenchen-Gladbach, W-Germany, and familiarised with the operation of the various machines at the MANNESMANN-Hoesch large-diameter pipe works. Several of the MANNESMANN-MEER and MANNESMANN-HOESCH engineers and technicians, on their part supervising the construction of the plant in Rourkela are staying on an additional year, after which the Indian personnel will no longer have need of their advice and assistance.

These experts are spending more time abroad than they do in Germany, being in India today, tomorrow perhaps in Africa, then again in South America or elsewhere. MANNESMANN-MEER is building pipe plants of the most diverse types at many points the world over. For there is a steadily expanding demand everywhere for pipe, particularly for the long-distance conveying of oil, gas, soon also of coal, for the irrigation or sprinkling of agricultural soil, and for supplying industrial installations and human settlements.

The successful completion of the Rourkela pipe welding plant, which in two-shift production can manufacture some 200,000 to 380,000 tons of pipe with outside diameters ranging from 20 to 8 5/8″ annually, has meanwhile led to new Indian contracts. Thus, MANNESMANN-MEER AG will erect two plants for the production of medium—and small-



***Prime-Minister** Nehru inspecting the Mannesmann-designed and constructed large-diameter pipe welding plant at Rourkela*

calibre gas and water pipe, one in Bombay for Zenith Steel Tubes Ltd. and the other in Ahmedabad for Bombay Steel Tubes Ltd. This W-German firm, one amongst many, will therefore continue to participate in the task of India's industrialisation.

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India and GDR

Since the foundation of the GDR on October 7, 1949, trade relations with other countries have undergone a remarkable development. According to the economic planning of GDR, the production of all kinds of goods has increased from year to year and the exchange of commodities with other countries, too. The first steps to develop trade relations with India took place in 1954. The conclusion of the first Trade Agreement between the Government of the two countries in 1954 and the establishing of a Trade Representation of the GDR in New Delhi with branch offices in Bombay, Calcutta and Madras in 1956 laid the foundation for further and closest trade relations between the two countries. The most decisive factor in this connection was the application of the principle of equality of rights and mutual advantage in the exchange of goods.

The fact that the GDR on the one hand represents a stable and permanent market for the sale of Indian products, and on the other hand is able, as a highly industrialised country, to supply machinery and equipment, fertilizers, chemical products and other industrial products in accordance with requirements under the Indian Five-Year Plan, may be regarded as an important precondition of this development.

The GDR, like all socialist countries, attributes essential importance to the principle of balanced trade. Therefore, the GDR made allowances to the specific Indian conditions of development by a supplementary agreement according to which all proceeds from its export to India were to be put to a special account in non-convertible Rupees and only used for the import of Indian products. The first years of trade relations have shown that the most rapid way to develop foreign trade is to conduct it on the basis of agreements on government level. Agreements of that kind express respect of state authority; long-term trade and payment agreements are furthermore a step ahead in the development of trade relations, since they offer the best prerequisites for the prospective preparation and organisation of trade. Aware of this fact a long-term Trade and Payment Agreement covering the period from 1960 to 1962 was concluded on government level on December 18, 1959. The first eighteen months showed, that the expectations of the two parties regarding a further rise in the volume of trade were fully justified and realistic.

India's export to the GDR in this one and a half year amounted to 10.6 crores of Rupees and the GDR's export to India during the same period amounted to 10.4 crores of Rupees.

The first seven months of this year show a further increase of the volume of trade in comparison with the same period in 1960. This is promising for the successes of the forthcoming negotiations between the two governments on the 1962 Trade Plan, the last year of the long term Trade Agreement.

Next to fertilizers and all kinds of raw films, a considerable share in the increase of GDR's export goes to engineering products. In 1960, the GDR achieved great success in increasing her supplies in printing machinery. Now it has a leading position in India's import of this item. According to her capacities, the GDR is ready to make a substantial contribution towards the further industrialisation of India in the third Five-Year Plan and has shown its readiness to assist the national economic development of India by means of economic co-operation, too. The first results in this respect have already been achieved. Agreements have been concluded on the co-operation in producing machine tools, high tension cables, textile machinery and typewriters. The establishment of the third machine factory of HMT will be started in technical collaboration with the GDR. Negotiations for erecting a plant for Moped power assisted bicycle production in several factories are in progress.

The GDR's participation in the II Indian Industries Fair will be another instance of the everexpanding friendly relations between the two countries.

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Czechoslovak-Indian Economic Cooperation

V. PACL
Economic Counsellor of the Embassy of the Czechoslovak Socialist Republic in India

The rapid post-war development of Czechoslovak industry, which has increased its production fourfold over the already high level of 1937, and the even more spectacular expansion of machine-building, have enabled Czechoslovakia to expand her economic relations, particularly with the developing countries, on a scale vastly greater than that of pre-war times and may be more so than any other country of her size and population—40,000 square miles and 13½ million inhabitants.

Czechoslovak manufacturers of heavy machinery, who have a good experience and over 100 years tradition and reputation at their back, are in a position to supply machinery and equipment as well as render technical assistance for the establishment of all types of complete industrial plants abroad, through Messrs. Technoexport, Foreign Trade Corporation for the export of complete industrial plants, Praha, Czechoslovakia. For instance, steam and water power stations, Transformer Stations, Ceramic Factories, Cement Factories. Sugar Factories, Oil Refineries, Steel and Rolling Mill Plants, Rubber Industry Plants, Heavy Machine Building Plants and other complete engineering plants of various types have been supplied to most of the countries of Europe, Asia, South America and Africa.

In accordance with the Economic Agreement concluded between the Government of Czechoslovakia and India, Czechoslovak manufacturers will participate in the establishment of Foundry Forge Plant, Heavy Machine Tool Plant, Heavy Power Equipment Plant and High Pressure Boiler Plant during India's Third Five-Year Plan. Besides the longterm credit of about Rs. 17 crores extended by Messrs. Technoexport of Prague before the signing of the Economic Agreement between the two Governments, Czechoslovak Government has agreed to another longterm credit of Rs. 23.1 crores at a nominal rate of interest, viz. 2½ per cent.

Foundry Forge Plant In Ranchi

The Foundry Forge Plant in Ranchi, Bihar State, is being established in collaboration with Skoda Works, Plzen, who have prepared the Detailed Project Report, are supplying the machinery and equipment and render all technical know-how for the erection and production. The Foundry Forge Plant in Ranchi will be the biggest engineering project of its kind in Asia and will produce medium and heavy castings and forgings which will mainly be used as semiproducts in Heavy Machine Building Plant and Heavy Machine Tool Plant, both at Ranchi. Simultaneously, the Foundry Forge Plant will also produce finished rolls for all rolling mills in India. This Plant will be established in three

stages and the production capacity per year after the completion of the third stage to the agreed extent, will be as follows:

A	Grey Iron Castings, Ingot Moulds, and Rolls (max. piece wt. 100 tons)	...	46,600 tons/year.
B	Steel Castings, Rolls and Ingots (max. piece wt. 90 tons)	...	88,382 tons/year.
C	Forgings (max. piece wt. 30 tons)	...	32,954 tons/year.

Heavy Machine Tool Plant

The second engineering project will be the Heavy Machine Tool Plant, which will as well be located at Ranchi and will be established in collaboration with "Association of Czechoslovak Manufacturers of Machine Tools Messrs. OSAN, Prague, who will prepare the Detailed Project Report, supply the machinery and equipment and render all technical know-how for erection and production. The Heavy Machine Tool Plant will produce different types of heavy machine tools, such as: Lathes, Double Housing Planning Machines, Horizontal Boring Machines, Boring and Turning Mill, Portal Milling Machines, Radial Drilling Machines and Grinding Machines.

The Heavy Machine Tool Plant, in the first stage, will have an annual capacity of 10,000 tons of finished machine tools, and in the second stage the production capacity will be doubled.

Heavy Power Equipment Plan

The third engineering works will be the Heavy Power Equipment Plant which will be established in collaboration with Messrs. CKD, Prague, and the First Brno Engineering Works, CKD, Prague, will prepare the Detailed Project Report and supply the machinery and equipment, and will, together with the First Brno Engineering Works, render the technical know-how for erection and production. The site for this plant has yet to be finally decided. This Plant will produce steam turbines and alternators with an output of 12,000 KW and 25,000 KW. The annual production capacity of this plant, after the completion of first stage, will be 620 MW (10 pieces of turbines and 10 pieces of alternators with an output of 12,000 KW and 20 pieces of turbines and 20 pieces of alternators with an output of 25,000 KW) besides the production of spare parts. This Plant will also produce condensate extraction pumps, cooling pumps water-jet air pumps and feed pumps.

A Grey Iron Foundry will also be established. It will have an annual capacity of 3,000 tons in the first stage, but will be projected for an annual capacity of 10,000 tons per year during the second stage.

This Plant will be projected with the provision for further expansion in the second stage so that not only the annual production capacity can be doubled but it should also suit the manufacture of steam turbines and alternators of 60 MW capacity.

High Pressure Boiler Plant

The fourth engineering factory will be the High Pressure Boiler Plant which will be established in collaboration with Messrs. First Brno Engineering Works, who will prepare the Detailed Project Report, supply the machinery and equipment and render the technical know-how for erection and production. The site for this plant, too, has yet to be decided. This plant will produce, after the completion of its first stage, High Pressure Boilers of the capacity of output from 125/tons/hours to 330/tons/hour and Valves and Fittings. The annual production capacity of this plant will be equal to the production of 12 high pressure boilers with an average output of 200 tons/hour and 2435 tons of Valves and Fittings.

This plant will also be projected in such a way that it could be expanded during the second stage and that its annual production capacity could be approximately doubled (the production 20 boilers sets for package power plants included).

To avoid, as far as possible, the drain on India's foreign exchange reserves, Czechoslovak suppliers have agreed to include in the Detailed Project Reports some machines and equipment which are available in India.

Czechoslovak Government has further offered as a gift to India the necessary equipment and technical assistance for the establishment of the Central Machine Tool Institute. The functions of the Institute will be as follows :

Design development of machine tools,

Standardization,

Manufacture of prototypes,

Training of Designers and Design personnel,

Machine Tool Research,

Research and Metal Cutting,

Documentation Centre.

The notable advantage of the technical co-operation between Czechoslovak suppliers and Indian investors lies in the fact that the Czechoslovak technicians will pass on, in the real sense of true co-operation, to their Indian counterparts all their experiences so as to make the new established factories absolutely independent and self-sufficient. The Czechoslovak exports and technicians will no doubt do their best in order to establish all these plants for the production of complete machinery and equipment in accordance with the terms of the mentioned Agreements so that these plants may serve as a powerful base for the consolidation of the Indian economy.

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Polish—Indian Relations

Relations between Poland and India, both cultural and economic, in the real sense of the term, began only after India had regained her independence. In pre-independence days there existed on a small scale, almost negligible trade exchange between India and Poland through the intermediary of other countries.

In the cultural sphere too Polish-Indian contacts were very limited. There were only sporadic visits of Poles in India and vice versa. The press in both countries carried little news of each other. Indian literature was practically unknown in Poland and the few books on India in circulation were mainly travelogues. No doubt, studies in Indology in Polish universities were started quite a long time ago. But these were chiefly concentrated on Indian linguistics, classic literature and philosophy.

Rabindranath Tagore's appearance on the Indian scene brought in a new wave of interest on India in Poland. Writings of Tagore transfixed a new and realistic image of India in the minds of Polish intelligentsia, who until then conceived India as the land of exotic yogis, maharajas, tigers and elephants.

India's attainment of independence opened new possibilities for shaping and constantly developing all-sided cooperation between the two countries.

By the time India became free, Poland had undergone vast changes in her political and economic structure and she was firmly entrenched on the road of industrialisation and progress. The adoption by India subsequently of a road to progress through planned economic development created suitable atmosphere for Indo-Polish collaboration. Opportunities are opening up when the economies of both the countries could act as complimentary to each other.

With the launching of every new five year plan, newer and newer avenues of cooperation for mutual advantage came to the fore. Today the trade exchanges between Poland and India have increased twenty-four times from what it was in 1952—a tangible measure of the dynamic growth of mutual economic relations.

The launching of the third five-year plans of both Poland and India this year opens new perspectives for Polish-Indian collaboration. Already in the initial period of the plan in 1961 Poland's total trade turnover with India is expected to be twice of the previous year.

On the political level, the policies of the two countries often converge on common grounds. Policies of India and Poland in the international arena are directed towards the attainment of international detente and security; both countries support the struggle against colonial and neo-colonial practices.

India and Poland not once cooperated together on the international arena to achieve these ends, to mention only in the International Armistice Commission in Korea and the International Commission of Supervision and Control in Vietnam, Laos and Cambodia.

New strength of Indo-Polish understanding and friendship is marked by the firm expression of India's Prime Minister calling for a recognition of Poland's Western Boundaries established after the Second World War. Poland returned to her historically rightful boundaries settled them with 8 million people and fully integrated them economically and culturally. The timely warning of the Indian Prime Minister that only a war can bring changes to the new situation in Europe, which came into effect both as a result of the second world war and of the social changes of Eastern and Central Europe may prompt—we hope, all those who are still lagging behind with their recognition of the present realities to recognise those unchangable facts.

Mutual regard and goodwill towards each other also found expressions in the visits of Polish statesmen in India and the visits paid by Indian dignitaries in Poland. Mention should be made here of the visits of Prime Minister Nehru in Poland in 1955 and the subsequent visit of the Vice-President Dr. Radhakrishnan in 1956. Within the past four years the Polish Prime Minister J. Cyrankiewicz visited India twice/in 1957 and in 1960/. The current visit of the President of the Council of State of Poland, Aleksander Zawadzki in India and the friendly and cordial reception accorded to him is yet another yardstick of our friendly relations.

These developments have created positive climate for cooperation in other fields, such as for instance in the cultural field. There is a growing interest in both the countries to know better about each other. This is manifested in the increased exchanges of scholars, visits by journalists, writers and artists. The signing in New Delhi of the agreement for cultural cooperation between the two countries in 1957 was an expression of these growing contacts and further more it promoted their development.

Information on Poland—political, economic and cultural, appear almost everyday in the Indian press. Similarly studies on various aspects of life in contemporary India regularly appear in the Polish press.

The close cooperation existing at all levels between Poland and India helps the two nations understand each other better and better and at the same time acts as a factor promoting the cause of world peace.

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A Day at the "Krasny Proletary" Plant

A. ILYINSKAYA
APN Correspondent

We have been repeatedly approached by foreign readers with the request of telling them of how the management of enterprises in the USSR is organized. With this in view I visited the "Krasny Proletary" Plant whose engine lathes are well known beyond the Soviet Union. The Plant has been making lathes for Austria, the Federal German Republic, Britain; many machines have been shipped to the United Arab Republic, Viet-Nam, Japan, Guinea, India.

The engine lathes made at the "Krasny Proletary" were exhibited at all foreign industrial exhibitions and fairs which the Soviet Union had been taking part in.

And in each case they were given a high appraisal as being the cheapest, sturdiest and economically most efficient. The latest model of the lathe—the IK62—has drawn the attention of numerous foreign specialists by its design principles and details. Usually a lathe operator had to turn a hand wheel in order to set the carriage of any lathe in motion. On the IK62 the lathe operator has but slighly to press upon a handle to make the lathe do the needed operation. These engine lathes are exhibited at a fair this year in Delhi.

The Centre of Technical Culture

The "Krasny Proletary" Plant is located in Moscow. Its production premises cover a territory of 34 acres. The plant is justly considered to be the centre of technical culture in Soviet mechanical engineering. The workers of the "Krasny Proletary" were the first to employ high and super-high metal-cutting speeds. They have organised flow-line production of parts and elements on multi-spindle and aggregate machine tools. In the assembly shop there is the famous "walking" conveyer which transfers the machine-tool by one position.

The various links of the plant management perform the operative schedule planning, regulate and control the production process, provide for the mutual connection and co-operation between the shops, introduce new equipment, create new machine-tool models. All the threads of the management come together at the directors's. It is he who is responsible for the fulfilment of the state plan and for the technical policy. The director is given active assistance and his activity is controlled by the workers and by the Plant's trade union committee of the Machinebuilding Workers' Union.

Just as most Soviet leading functionaries who are over fifty, Georgi Surguchev, the director of the Plant, had started his working career as an ordinary

worker. His enterprise sent him to study at a mechanical engineering technical school. He graduated from college when he was quite a mature person, after studying there without discontinuing his work at the plant. He has been working at the "Krasny Proletary" for over a quarter of a century. About seventeen years he worked as designing engineer; at first as rank-and-file designer and then as leading designing engineer. He also was the plant's chief engineer, and in 1954 he was appointed the "Krasny Proletary's" director. Georgi Surguchev is a tall thick-set man. There are round glasses on his round face. And behind them are near-sighted light-coloured eyes.

The State Plan is the Main Thing

As he was acquainting me with the work of the "Krasny Proletary" the director picked up the summary report of the results of the plant shops' and services' activities. Pointing to the column reflecting the work of the assembly shop he explained:

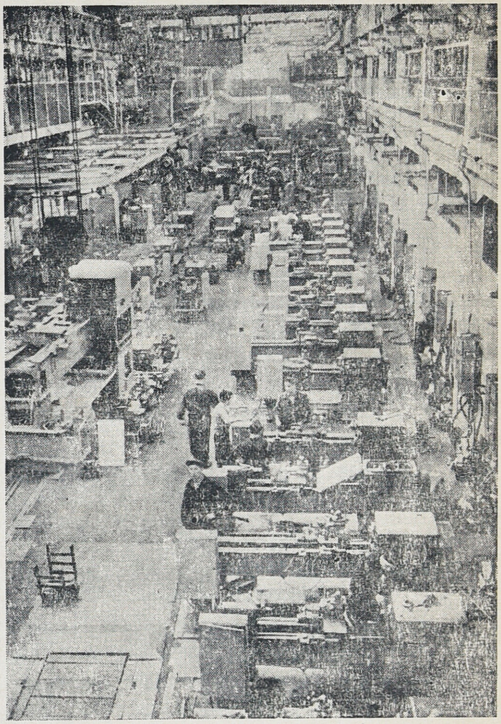
"The assembly shop is the mirror of the entire plant's work. If there are no stand-stills there and the machines are assembled according to schedule, then the plant's great organism is functioning smoothly and I can devote myself to prospective issues: next year's plan, capital construction, new equipment, and many other things."

Every week the director convokes dispatcher's conferences attended by all shop superintendents and department heads. They report on how the plan is being carried out, listen to criticisms on the part of their collegues, and criticize them in turn. It is the state plan that underlies all activities of the "Krasny Proletary", just as those of any other Soviet enterprise.

In 1962, the plant has to put out several thousands of machine tools. They are all to be made according to contracts with clients. The planning department has drafted the plan for the year both as to the nomenclature and as to labour input and has dived it into assignments for the quarters of the year and for the months. The chief technologist's department has made a calculation of the production capacities and given its suggestions concerning enlarging the capacities of some production sections. The production department has fixed by what day of each month the shops must complete making parts for each special machine.

Once the Moscow Economic Council has approved the plant's plan, all the management links of the plant will start preparing for carrying out the plan: they will order the necessary materials and tools, conclude contracts for the delivery of semi-manufactured goods and ready-made elements, they will be doing a lot of other things without which the rhythmic work of a plant would have been unthinkable.

The plan will be made known at each shop and to every worker. The shop programme will indicate the commodity and gross output of goods, their nomenclature, the planned productivity of labour, the number of workers engaged, the wage fund.



Krasny Proletary Plant

Such planning practice gives full independence to the shop management.

The staff of the "Krasny Proletary" is steadily engaged in creating new machine tools, improving and enlarging production. When drafting their seven-year plan they included in it semiautomatic multi- spindle upright lathes that are needed in the country. Several hundreds of them are to be put out in 1963.

In order to show me another side of his activities, Georgi Surguchev invited me to see the

building site of the new production block of the "Big Krasny Proletary", where the upright lathes will be produced. The shops are to be equipped with the latest machines with programme and automatic control. "Big Krasny Proletary" has placed orders with tool makers for implements and tools designed for high-speed machining of parts.

Workers Take Part in Managing the Enterprise

Not a single issue, whether big or small, involving the life of the collective body and production, is solved without the participation of the trade union organization. All workers, office employees and specialists at the "Krasny Proletary" are members of the Machinebuilders' Trade Union. They elect to their committee the persons who enjoy the greatest authority at the plant.

Just as at all other Soviet enterprises, there is a presidium of the permanent production conference functioning under the auspices of the plant's trade union committee. It includes 121 workers, engineers and technicians. Besides, there are such bodies at each shop, including 400 presidium members in all. These conferences deal with all important issues in the life of the plant and its shops. Thus, through these conferences the workers take active part in managing the enterprise.

As a rule, the director, the trade union committee chairman and the chairman of the conference presidium find reasonable co-ordinated solutions to each issue. Such was the case with the erection of the new block, for instance. The presidium helped in the more adequate layout of the equipment, took care that all safety engineering rules were conformed with, took part in placing orders with other enterprises.

The conference presidium insisted that the part of the block which was to house 50 per cent of all service facilities should be built first, since there was a lack of them at present.

But it isn't in all cases that everything works so smoothly. Thus, the management refused to reconstruct the in-patient medical ward and dispensary for the plant's personnel this year. The plant's trade union committee raised the issue at the trade union conference which found the stand taken by the trade union committee to be correct. The management could not help submitting to this decision.

At the outset of each new year the management and workers conclude a collective agreement. The workers take upon themselves to fulfil the plan, while the management lists in the collective agreement the measures that it will take to improve safety engineering, labour conditions, production. The agreement also fixes the term when the construction of houses for the workers is to be completed.

The management and the trade union committee concern themselves about their workers' rest and recreation. Each year about a third of all the workers of the "Krasny Proletary" are provided with accommodations at sanatoria and rest homes. There is a first-rate young-pioneer camp for children of school age. The tiny tots have creches and kindergartens at their disposal. The building of new creches and kindergartens is also provided for by the collective agreement.

At the end of each quarter of the year the director reports about his work to the plant's collective body. The shop superintendents do the same to the personnel of their respective shops once a month. So social principles are coming to hold an increasingly prominent place in the mangement of a Soviet enterprise.

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INDO-
FOREIGN
COLLABORATIONS

Simpsons

Founded in 1840, Simpsons pioneered Coach Building in India. They were the

- FIRST to build carriages similar to European designs
- FIRST to build the first Railway coaches in South India
- FIRST to attempt Motor Car manufacture
- FIRST to build steam buses
- FIRST to build and operate Passenger Bus Service
- FIRST to import American chassis
- FIRST to manufacture Simpsons' Producer Gas Plants.

Their latest FIRST is the complete indigenous manufacture of Perkins P6V Automotive Diesel Engines in India.

Simpsons now manufacture Perkins Automotive, Industrial, Marine and Agricultural Diesel Engines.

Simpsons still continue to build better Bodies of all types and have among their clientele major State and quasi State Road Transport organisations besides private operators. Simpsons also specialise in the manufacture of Light Engineering Specialities like special types of tanks, articulated tanker trailers etc. for Corporations, Municipalities, Railways etc., and equipment for garages.

India Pistons

This company is the pioneer in India for the manufacture of Pistons, Piston Rings, Liners, Gudgeon pins etc. for both automotive and stationery engines. Founded in 1949, India Pistons Ltd., manufacture these products in collaboration with Messrs. Associated Engineering Ltd., who are the holding company for Hepworth & Grandage Ltd., Wellworthy Ltd., and Bricovmo and their products are marketed under the trade names of Hepolite, Wellworthy and Covmo.

The complete Piston assembly—Piston, Piston Ring and Gudgeon pin—is manufactured in India Pistons' own plant and all the castings too, aluminium and grey iron, are manufactured in India Pistons' own foundries.

More than 40% of the Engines operating in India are fitted with India Pistons' Quality Products.

Addisons Paints & Chemicals

Founded in 1948, Addisons Paints & Chemicals Ltd., were the FIRST to set up an up-to-date Lacquer Factory in India. Addisons Paints & Chemicals manufacture a comprehensive range of Paints and through their research and development occupy a reasonably high position in the hierarchy of the Paint Industry.

Keeping step with the march of industry in general, the Company has expanded its activities to cover a wide range and variety of special finishes which are marketed under the distinctive Brand names "SPARTAN", "ADCOLAC", "APC".

Today, they offer under these famous names "AUTO LACQUERs", "DURAFLEX SYNTHETIC FINISHES", "SPARTAN PLASTIC PAINTS" and a host of other paint products for varied purposes.

The Wheel & Rim Co. of India

THE WHEEL & RIM CO OF INDIA LTD. started manufacturing bicycle wheel rims in the year 1955. With modern machinery and modern techniques of production, this company has made a mark for itself as one of the leading Bicycle Rim Manufacturers in India. The Wheel & Rim Co. of India has exported quite an appreciable number of rims to the Middle East countries and Ceylon and have entered into long term contracts with Distributors in several countries for the export of Rims.

'DIAMOND' and 'JUBILEE', the trade names under which this company markets their rims, have now become a household word all over India. ***

The Enfield India Limited

Sponsored by The Madras Motors Private Limited, who and whose predecessors have had several years' experience in marketing and servicing motor cycles and who were also the biggest dealers of motor cycles in the country, THE ENFIELD INDIA LIMITED came into being late in 1955. A licence under the Industries (Development & Regulation) Act was originally given to The Madras Motors Private Limited who entered into a technical collaboration agreement with The Enfield Cycle Co. Ltd., U. K., the world-famous organisation manufacturing ROYAL ENFIELD motor cycles. Later, The Madras Motors Private Limited transferred this technical collaboration agreement and licence to the newly-formed Enfield India Limited.

The licence granted by the Government of India under the Industries (Development & Regulation) Act was for a phased programme of five years during which the indigenous content was to increase gradually, ultimately reaching 75 to 80 per cent. Though, strictly speaking, this phased programme commenced only by end of 1956 (when the first stage of the Company's own buildings was ready) roughly in about four years' time, an indigenous content of about 80 per cent has been reached. The balance 20 per cent will consist of proprietory items such as electrical equipment, carburettors and chains—all of which will also come under indigenous content, directly indigenous ancillary industries are set up. The main items that are bought from indigenous ancillary industries are tyres, batteries, pistons, ball bearings, spark plugs, rubber components and some hardware items.

The total effective capital at present employed is about Rupees one crore, but in due course-that is, as the expansion plans of the Company get implemented-this will increase.

Inclusive of sales and service staff, the total strength of the establishment is 1200. With the implementation of the expansion plans, there will be employment opportunities for another 1000 persons. Besides, quite a large number are employed by its dealers and sub-dealers all over the country and by ancillary industries from whom they buy components.

Sales and service are in the capable hands of its sponsors, The Madras Motors Private Ltd., who in turn are served by a strategic net-work of 150 dealers and sub-dealers from Kashmir to Kanyakumari.

The industry is at present licensed to produce 5000 motor cycles per annum. With the present production of over 550 vehicles a month, this target has already been reached. With larger foreign exchange for raw materials now made available by the Govt. of India and by better utilisation of plant and machinery and modern productivity methods, the Company hope to be able to step-up production to about 7000 motor cycles this year.

This is the first unit not only in India but also in West Asia and South East Asia producing motor cycles.

The Company has also been licensed for the production of 6000 scooters per year and also Villiers engines. This scooter project for which the Villiers 173 c.c. engine will be used is in collaboration with Messrs. Phelon & Moore, who are making the "PANTHER" scooter for which also the Villiers engine is used. The trade-name will be "ROYAL ENFIELD". Their collaborators' design has been developed further by them to suit the conditions obtaining in India. The scooter will be introduced into the market during the second half of 1961. The price of the scooter will be around the price of any other scooter available in India today.

Messrs. Villiers Engineering Co. Ltd., Wolverhampton, U.K. are the manufacturers of the World-famous Villiers engines. Their engines are used by a number of manufacturers of motor cycles and scooters in U.K. They also manufacture engines for industrial and agricultural applications and we will be taking-up these things for manufacture shortly. There are innumerable usages for these engines. They are used as prime movers in pumping sets, domestic illuminating generators, concrete vibrators, agricultural tractors, fork lifts, inboard and outboard motors, compressors, insecticide spraying equipments, railway trolleys and any other application which needs a compact and efficient power unit developing upto 5 h.p.

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Automobile Products of India Limited

Automobile Products of India Limited came into existence as the Manufacturing Concessionaires in India for Rootes Group Cars, Trucks and Parts in 1949. It was founded as a result of negotiations between the Indian Ministry of Commerce and Industry and Rootes Motors Limited for the phased manufacture of Hillman Cars and Commer Trucks. Assembly operations of these products commenced in April, 1950, and for the next four or five years, Rootes Group Cars, Vans and Trucks attained a great measure of popularity in the Indian market.

For various reasons, however, the Manufacturing Programme for Hillman Cars and Commer Trucks did not go through, and the licence granted to the Company was withdrawn early in 1954. Thereupon, Rootes Motors Ltd. sold their controlling interest in the Company to Mr. M. A. Chidambaram, the well-known Industrialist and Banker of South India and the present management took over the concern in May, 1954.

It was hoped that the change in Management would result in the reinstatement of the Company's Manufacturing programme for Rootes Group vehicles, but due to the poor off-take of Motor Vehicles in the country, the Government were unable to see their way to restoring the licence for the manufacture of Motor Vehicles.

It, however, directed the Company to consider instead going into the manufacture of ancillary products. The Management was now faced with two alternatives—either to wind up the operations of the Company in as orderly a manner as possible, or to reorganise and enter into an entirely new field of productive activity. Happily, its decision fell in favour of the latter course and since that decision was taken, the Company has never looked back. Negotiations were entered into almost immediately with a number of foreign organizations and as a result, manufacturing licences were obtained for the progressive manufacture of Lambretta Scooters and 3–Wheelers in collaboration with Messrs Innocenti, S.G., Milan, Italy, Borg & Beck Clutch Assemblies and Lockheed Brake Parts and Brake Fluid with Messrs Automotive Products Co. Ltd., Leamington Spa, England, and Firestone Brake Lining with the Firestone Tyre & Rubber Co., Akron, U.S.A.

Lambretta Scooters

The Company commenced marketing Lambretta Scooters in September, 1955. Within a year, almost as many Scooters were on the roads as the total number of two-wheeled machines sold during the three previous years.

Although initially the Company assembled these machines from components imported from Italy, it lost on time in setting up a regular phased manufacturing programme with a view to progressively increasing the indigenous content of the vehicles, currently, nearly 70 per cent of the Scooter by value is manufactured indigenously.

There is no doubt that the Lambretta will go a long way to alleviate some of the transport problems of this country. This machine has already become an everyday sight in the towns and cities of the country, and its popularity is fast spreading to the more rural areas where its economy and sturdiness are factors that make it a worthwhile investment. Further, the Company has organised a country-wide net-work of spares and service facilities, an advantage that makes the Lambretta very easy to maintain.

Clutches, Brakes & Brake Lining

While the first project forms the major pre-occupation of the Company, licences have also been obtained for the manufacture of Borg & Beck Clutch equipment and Lockheed Brake Systems and Fluid from the Automotive Products Company Ltd, U. K., who are the Licensors. These devices are practically universally fitted on almost all makes of motor vehicles and the programme of their manufacture has been planned to follow that adopted by the Company's Associates.

Here again, within a short time, approximately 80 per cent of the components of numerous Clutch Assemblies are manufactured indigenously, and these are being supplied to manufacturers of cars and trucks in India as original equipment. The Clutch manufacturing project has recently been expanded to include the manufacture of Clutches for Jeeps, Fiat cars and Tata Mercedes-Benz trucks under licence from Messrs Borg Warner and Messrs Fitchel & Sachs of West Germany. With the technical assistance of the Firestone Tyre & Rubber Co. of Akron, U. S. A., Brake Lining for a wide range of vehicles is also being manufactured.

The Government have been following with keen interest the progress of the Company, and have rendered considerable assistance in the implementation of its various schemes. There have been initial difficulties, but it now may well be said that the Company's teething troubles are all over. A keen awareness that the years ahead will be a period of hard work pervades the atmosphere of the plant and if the progress of the initial period is only criterion, the Organization may very well look forward to being in the forefront of the country's manufacturers of essential automobile components, without which it will be well-nigh impossible for the nation's growing automobile industry to flourish.

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Caltex Oil Refinery

The Caltex oil refinery inaugurated on November 30, 1957, is an offspring of India's Second Five Year Plan. It is one of the most modern and efficient refineries ever erected. It is the first largest single construction project undertaken by private enterprise in Andhra Pradesh, representing a total investment of over seventeen crores of rupees. Locating a facility of its type and size in Andhra Pradesh was motivated by the many advantages that would accrue to India's national economy.

The original decision to construct the refinery was simple and practical. India has a definite need for increased supplies of petroleum products and it was deemed essential that a refinery should be located on the East Coast, as the refinery building programme hitherto had concentrated on the West Coast, namely, the Bombay area. Accordingly, Caltex stepped in to build and staff a refinery on the East Coast.

After a thorough engineering study of many possible locations, Visakhapatnam was selected as the site for the Caltex Refinery in India. The main advantages of Visakhapatnam are the facilities of a harbour for handling ocean going tankers, rail access by the South Eastern and Southern Railways to provide distribution inland, and road access by means of the Grand Trunk Highway for local deliveries. In addition, development of a new major industry in this area would be a significant contribution to official plans for the progress of the State and nation.

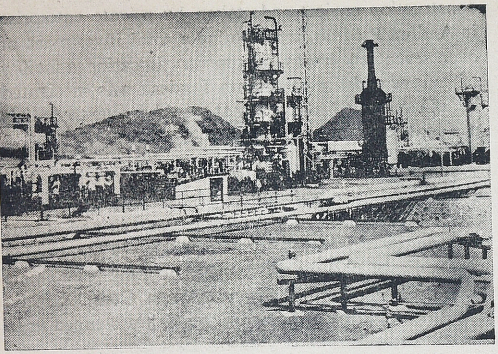
Accordingly, an agreement was reached with the Government of India which was signed in New Delhi on March 28, 1953. Later a lease for the required 515 acre site was concluded with the Visakhapatnam Port authorities.

In 1955, construction activity began. Huge bulldozers, shovels, scrapers, and other land clearing machinery were steered into service. Local industries took on a bustling new look, stimulated by the construction needs of our builders. Indian suppliers, for example, were called upon to supply 16,000 tons of cement and innumerable other building materials.

Smaller business sprang up to provide asbestos, timber, bricks and crushed rock. At the peak of construction, more than 9,000 local persons were employed in all phases of the work. As a result, hundreds of local townspeople have learned new trades, such as welding, pipe fitting and other construction skills. Today, these men can look forward to future lives of wider usefulness.

Here are a few facts about the Caltex oil refinery at Visakhapatnam :—

The Visakhapatnam harbour provides access for the vital crude oil supplies without which the refinery cannot function. Each of the two oil berths is 600 feet in length and has a water depth of over 30 feet



The propane Decarbonisation Plant of the Caltex Oil Refinery at Visakhapatnam

alongside. Ocean-going tankers are accommodated here, and by having two berths, the crude tankers which arrive about every six days, as well as the product tankers going to Calcutta and Madras, can be handled simultaneously. On arrival, the crude tankers are connected to a 20 inch pipeline which conveys the oil to the refinery storage tanks at a rate of about 250,000 gallons per hour. Each of the crude oil storage tanks has a capacity of over 6,000,000 Imperial Gallons. Some idea of the size of these tanks may be conveyed by the fact that, when the Governor of Andhra Pradesh visited the refinery site during construction, his car was driven right into and around the inside of a tank. The diameter of each tank is 160 feet!

Designed by some of the world's best petroleum engineers, with most up-to-date refining processes, it produces "IC-Plus" petrol, "Key" and "Lock" brands of Kerosene, and several grades of Diesel and Fuel Oils. Todate, this is the only refinery in India producing a special low sulphur content fuel oil for use in India's steel mills.

The refinery's output is readily available, not only to established markets but to new industries drawn to the State of Andhra Pradesh by its very presence. It provides employment for over 500 Indians, as well as opening new job opportunities in auxiliary industries necessary to its operation.

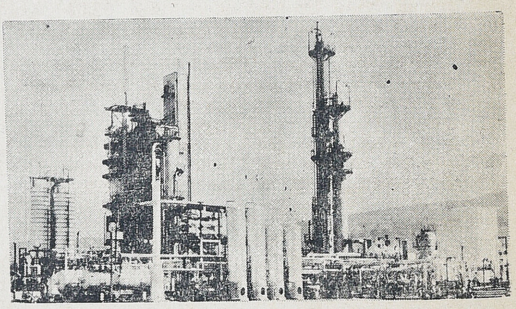
The oil refining industry in India is comparatively a new field. Consequently, it was to be expected that there would be a dearth of technical man power familiar with the intricate refining operations. Caltex has circumvented this problem by employing modern "on the job" training techniques to enable personnel drawn mostly from Andhra Pradesh and adjoining states to take up responsible positions in a relatively short time. The rapidity with which Indian employees have been able to replace overseas personnel is a tribute both to the employees themselves and to the training methods used to give effect to an important Caltex policy.

Caltex people work in a clean, orderly, and pleasant environment. The oil refinery is one of the safest places in which to work, as well as a model of "Good Housekeeping". To enable employees to relax after work, well equipped clubs and extensive recreation facilities have been provided. In addition, almost one third of the Caltex employees enjoy the use of recently constructed, modern living quarters.

In the field of training, Caltex sent a number of Indian employees to the Caltex refinery in the Philippines, where they were instructed on refinery operational techniques by Philippine nationals who had, in turn, received similar training at the Caltex refinery in the Netherlands. Other Indian employees have received specialised training in the U.K. and the U.S.A. The meaning of such an exchange of technical knowledge between such widely separated areas of the world speaks for itself in terms of international co-operation.

As partners in the progress of the city, state and nation, the Caltex refinery is playing an active role by saving considerable foreign exchange for the country, as well as by contributing to the growth of Visakhapatnam Port and City. For example, in 1960 the import of crude oil and the export of refined products accounted for almost 55 per cent of the total tonnage passing through the Port of Visakhapatnam. Payment to the Port for wharfage, pilotage, site rental, etc., amounted to Rs. 51 lakhs; funds spent locally by Caltex in Visakhapatnam area totalled Rs. 162 lakhs. During the same year, the operation of the refinery, by providing indigenously refined products for India, resulted in a net saving of approximately Rs. 2 crores in foreign exchange.

The refinery is conscious of its obligations to the community and has till now contributed to new and vital public service projects in the area.



The Fluid Catalytic Carcking Unit is the largest processing plant of the Caltex Oil Refinery at Visakhapatnam

With the location of this cleanest, safest and most efficient industrial plant in its precincts, Visakhapatnam can justifiably be proud of its contribution to progress of our fast developing young nation. ***

Cooper Engineering Ltd.

Messrs. Cooper Engineering Ltd. Satara Road have its origina in the small factory, founded by Sir D. B. COOPER in 1922 to meet the requirements of agricultural implements and machinery of the region. The factory faced many difficulties and underwent some changes during the first 12 years. But it gradually developed and took up additional lines of manufacture one after another like Diesel Engines, Textile Machinery, Machine Tools etc.

But expansion of these lines for mass production was a great hurdle to cross without adequate capital and perfect technical 'know-how' in those days. At this critical juncture in 1940, Seth Walchand Hirachand joined hands with Sir Cooper and filled the lacuna. With his able industrial leadership, business acumen and the capital, the concern not only kept the hold in all these lines, but made a striking progress. Since then it became a Walchand Group concern. The concern proved to be pioneers in the line of Diesel Engine manufacture in India. Cooper Engines, by now, have also found market in foreign countries.

Today, the firm's range of industrial engines include (a) Horizontal Single Cylinder engines from 5 b. h. p. to 58 b. h. p. (b) Twin cylinder horizontal engines from 100 b. h. p. 116 b. h. p. and (c) totally enclosed medium speed Vertical engines from 5 b. h. p. to 15 b. h. p. The total production is in the range of 46,000 b. h. p. per annum. And by now, more than 35,000 Cooper engines are in commission throughout the country.

The well-known Ricardo Comet Combustion system is incorporated in CR type Horizontal engines covering range of 8 b. h. p. to 40 b. h. p. and CVR type Vertical engines (3.5 b. h. p. to 15 b. h. p.). These engines are characterised by low fuel oil consumption, light power output with clear exhaust at all load and trouble free service.

Machine Tools

The enterprise of Cooper led to the first commencement of Machine Tool manufacture on commercial scale in India, in the year 1935. Beginning was made with Lathes, Shaping and Drilling machines which found a ready market. Second World War gave further fillip and from year 1939, M/s. Coopers were called upon to utilize their energies and resources to the fullest extent in order to increase their production.

After Independence, the concern undertook the manufacture of first grade Machine tools. The new series of heavy duty all geared shaping machines viz. GP-20", 24" and 32" are now in great demand. All the machine tools that are despatched from the works are tested to the standard of Grade 1 accuracy and quality of materials as laid down by the Machine Tool Directorate of Government of India and are provided with the official certificate therefor.

Chinchwad Factory

With the increasing popularity of the products other additional lines of manufacture in the field viz. Planing and Slotting machines have been taken up in collaboration with the renowned foreign manufacturers from U.K. and Czechoslovakia. A licence has also been secured for the manufacture of Vertical Turret Lathes and Horizontal Boring Machines.

With a view to accommodate all these lines, the Machine Tools Division was shifted from Satara Road to Chinchwad (Dist. Poona) last year. A modern and well equipped factory with up-to-date machinery has come up by now at Chinchwad and Cooper Planing machines have also entered successfully in the market.

Textile Machinery

Coopers are also manufacturing Textile Looms since 1930. The present manufacture ranges from 32″ to 100″ Reed space. They have also entered foreign market by now.

Meehanite Metal

In Cooper Engineering Ltd. entered into an agreement with the Meehanite Metal Corporation of America whereby they have become Sole Licensors for the Meehanite process in India, Pakistan, Burma and Ceylon. Licenses are also being given to some renowned foundries in India. Supplies of Meehanite castings in India are being successfully used in the Diesel engine, Automobile Machine Tools, Sugar Chemical, Textile, Ship building, Agricultural and many other industries. These Meehanite High Duty Iron Castings have a tensile strength upto 25 tons per sq. inch as cast, and are capable of being heat treated to give 35 tons tensile strength.

With these lines to their credit and well-knit sales organization, M/s. Cooper Engineering Ltd. have won good name in the line of Engineering Industry of India and thus contributing their mite to the prosperity of mother India.

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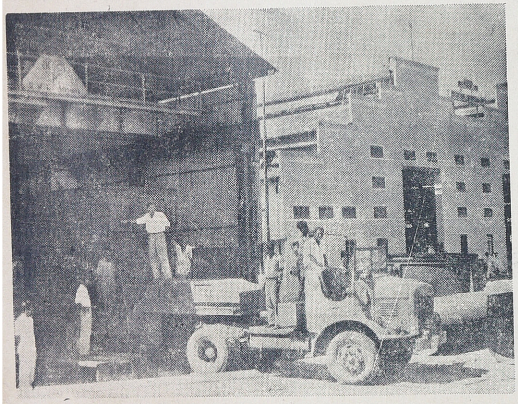
The K. C. P. Limited

The Central Workshop of the K.C.P. Limited at Tiruvottiyur, is one of the biggest Workshops in India equipped for the manufacture of Heavy Industrial Machinery. It was started in 1954 as a repair shop and to supply small components for their own Sugar Factories.

Sri V. Ramakrishna, C.I.E., I.C.S. (Retd), who retired as the Director of Industries of the composite Madras State, visualised the manufacture of Sugar Machinery in India. It is due to his farsighted industrial policy that a sugar factory was started in Orissa and sugar factory of the K.C.P. Limited at Vuyyuru was developed and enlarged. He felt the



need for a Workshop to manufacture Sugar Machinery in India, especially in this part of the country. This Workshop began to manufacture initially small items of Sugar Machinery like Juice Weighing Scales and Juice Heaters. By about 1957 the Workshop was expanded and it was able to supply a substantial portion of the then indigenously manufactured Sugar Machinery, and it supplied these to four Co-operative Sugar Factories in the then Bombay Deccan Area. By 1958 it started manufacturing Evaporators and Vacuum Pans besides other Machinery.

In collaboration with the renowned French Manufacturers of Sugar Machinery, Messrs. Fives Lille—Cail, they are now in a position to supply complete plants for the manufacture of Sugar and Boilers. In technical collaboration with Messrs. Eimco Corporation, U.S.A., they are also manufacturing Rotary Vacuum Filters for Cane Mud Filtration.

They will be completing supplies of two complete Sugar Plants for two Co-operatives Factories in Andhra which are under erection and are expected to go into production shortly. They have now contracted to supply by next year three more such plants to the Co-operatives in (1) Nizamabad in Andhra Pradesh, (2) Mohanur in Madras State, and (3) Chittur in Kerala State.

Besides Sugar Plants, they are also equipped to manufacture machinery for Cement, Sulphuric Acid and Super-Phosphate and other Heavy Industrial Machinery.

In addition to manufacturing the plant, they erect on site and give guaranteed satisfaction to the customers regarding the highest efficiency and productivity of the Plant.

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Jyoti Limited

Jyoti's origin did not follow a conventional pattern. Initially it was a mere Engineering Department of a Chemical Company, M/s. Alembic Chemical Works, Baroda. Out of this nucleus has now emerged a premier engineering company of India—JYOTI.

It was in 1935 that Jyoti-then an Engineering Department of Alembics-made a small-scale beginning in the manufacturing line of engineering products. Encouraged by the initial success attending this new venture, the Management set up in 1943 a separate maunfacturing concern called 'JYOTI'. Later in 1949, it became a Public Limited Company.

Belonging to the famous 'House of Amins', Jyoti Limited represents the traditional enterprising spirit of this House. In a way, therefore, Jyoti story is the story of what an enterprising Management can achieve in the face of various odds and attain what is its rightful due-success.

At the outset, Jyoti undertook the manufacture of diversified products. Since 1949, however, the Management realised that rationalization was essential for economical production and for maintaining a high standard of quality. Thereupon they decided to apply solely to the development of hydraulic and electrical machinery to the exclusion of other items.

Since 1954, Jyoti embarked on a new venture—the manufacture of Switchgear, switchboards, circuit breakers and other sub-station equipment, in collaboration with a reputed German firm M/s. Calor-Emag, E. A. G. of Ratingen, Germany. Within a space of only 17 years, Jyoti Limited has been able to make its impress in the comity of reputed manufacturers of India and today it shares with few others the front rank position in this field.

Jyoti Pumps

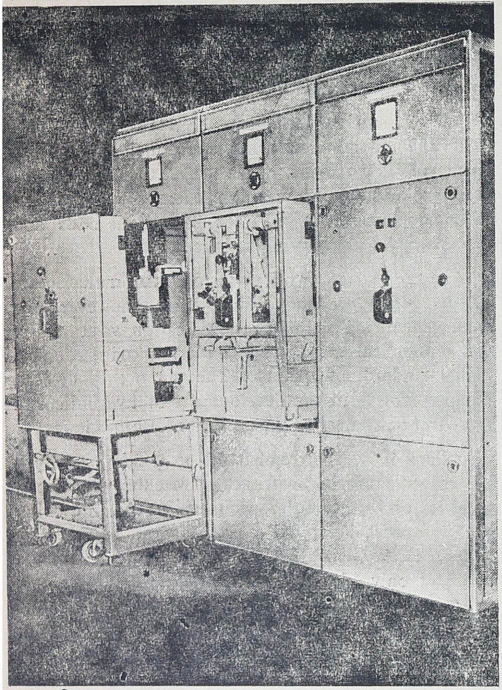
At present Jyoti Pumps, especially Deep Well Vertical Turbine Pumps and 'Unibuilt' Centrifugal Pump are well known throughout India.

In the centrifugal pump line it has been eminently successful as the Jyoti range of pumps is able to cover a vast majority of the usual pumping requirements. The range covers pumps large enough to deliver 12,00,000 G.P.H. The range of Jyoti pumps is as follows:

1. 'Unibuilt' Centrifugal Pump:
   Size: up to 6″ x 6″
   Capacity: up to 58,000 G.P.H.
   Heads: up to 210 ft.
2. Horizontal Split Casing Centrifugal Pump:
   Size: up to 30″ x 24″
   Capacity: up to 12,00,000 G.P.H.
   Heads: up to 160 ft.

3. Non-Clog Contrifugal Pumps:
Size: up to 24″ x 24″
Capacity: up to 6,00,000 G.P.H
Heads: up to 150 ft.

4. Vertical Propeller Pump:
Size: up to 36″ x 36″
Capacity: up to 10,00,000 G.P.H.



Jyoti Calor–Emag high tension Switch Board

5. Jet Pump:
Size: 2.1/2″ x 2.1/2″
Static suction lift up to 110 ft.
Capacity up to 4,000 G.P.H.

Deep Well Vertical Turbine Pumps

In the Deep Well Vertical Turbine Pump line, Jyoti took a pioneering start in India as far back as 1939 and to this date it has maintained its pioneering lead in the line. The stimulant to this development owed mainly to the nation-wide 'Grow More Food' campaign and the tube-well schemes launched by various State Governments. Since then Jyoti has made great strides in this field and has always been in the vanguard. Today throughout the country, the word 'Jyoti' is taken for a symbol of quality Vertical Turbine Pumps.

The present range of Jyoti Deep Well Vertical Turbine Pumps covers tube wells from 4″ to 24″ diameter. The pumps are suitable for a discharge up 4,00,000 G. P. H. and heads up to 300 ft. The pumps are available with vertical hollow spindle cage electric motors or pulley heads or gear heads.

Electric Motors

In 1948, Jyoti took to the manufacture of electric motors primarily as an adjunct to the pumps of its own make. Right from the inception it maintained a brisk rate of progress so much so that at present it is able to cover electric motors up to 1000 H.P. ratings. An outstanding feature of this development is that all work from design, tooling, and manufacture to testing has been the outcome of entirely Indian technical skill. The present range covers motors of the horizontal and vertical, squirrel cage and slip ring, textile, general purpose as well as special purpose types.

The manufacture of large electric motors is Jyoti's forte. By now it has acquired rich experience in the manufacture of these motors and has been able to place on market large electric motors in ratings of 225 H.P. 12 pole, 270 H.P. 6 pole, 450 H.P. 18 pole, etc. Following is the range of Jyoti Electric Motors:

1. *Horizontal*
   (i) Squirrel cage 3 phase, 0.10 to 500 H.P.
   (ii) Squirrel cage single phase, 0.5 to 1 H.P.
   (iii) Slip ring 3 phase, 10 to 1000 H.P.

2. *Vertical*
   (i) Hollow shaft 3 phase, 2 to 300 H.P.
   (ii) Solid shaft 3 phase, 2 to 75 H.P.

3. *Special Purpose*
   (i) Textile Motors, Loom and Card Motors: 0.5 to 2 H.P.;
   Ring Frame Motors: 7.5 to 12.5 H.P.
   (ii) Centrifugal Motors, 6, 12 and 24 pole three speed and 4, 8, 24 and 72 pole four speed motors.
   (iii) Multi-speed Motors, Dual Voltage Motors, High Torque Motors, Class-B insulation Motors, Special Frequency Motors, etc.

Jyoti Electrics—a separate plant

By 1958 it became clear that the existing plant would not be able to cope up with the expanding activities of the organization in the hydraulic as well as the electrical line. A stage had reached when the Hydraulic and Electrical Departments had to be separated. Eventually in the year 1959 a new plant,

exclusively devoted to the manufacture of electrical products—electric motors, starters, switchgear, switchboards, etc. had been set up. This development can be said to be a mile-stone in the career of Jyoti Limited.

Jyoti Calor-Emag Switchgear

The year 1954 saw yet another land-mark when Jyoti embarked on the manufacture of Switchgear and Switchboards in technical collaboration with M/s. Calor-Emag, E.A.G., of Ratingen, Germany, whose extensive experience over half a century had been a great asset. Starting with 25 Amps. oil immersed starters, the joint venture gradually covered up the manufacture of starters up to 100 H.P. ratings, L.T. switchboards up to 3000 amps. and H.T. switchboards up to 11 KV 350 MVA ratings.

Initially assembled from imported components, the L.T. and H.T. switchboards were progressively built from indigenous components, mostly manufactured by Jyoti. L.T. switchboards up to 3000 amps. and H.T. switchboards up to 11 KV 350 MVA at present manufactured by Jyoti, are practically independent of imported components.

The range of Jyoti Calor-Emag Switchgear and Switchboards is as follows :

1. *Full Voltage Starters*
   - (i) oil immersed Push-Button Type. Ratings up to 100 H. P.
   - (ii) Air Break Push-Button type. Ratings up to 10 H. P.
2. *Reduced Voltage Starters*
   - (i) Oil Immersed Automatic Star/Delta Push-Button type. Ratings up to 100 H. P.
   - (ii) Air Break Manually operated Star/Delta type. Ratings up to 20 H. P.
   - (iii) Automatic or Manually operated Oil Immersed Auto-Transformer type. Ratiugs up to 100 H. P.
3. *L. T. Switchboards*
   - (i) L. T. Iron clad Industrial type Distribution Gear. Up to 1000 amps.
   - (ii) Metal clad Cubicle and Draw out type gear. Up to 3000 amps.
4. *H. T. Switchboards*
   - (i) H. T. Draw-Out type Boards with air insulated and synthetic insulated bus bars. Up to 11 KV 350 MVA.
   - (ii) H. T. outdoor Kiosks 11 KV 350 MVA.
5. *H. T. Low Oil Content Circuit Breakers*
   Up to 11 KV 350 MVA.
6. *Switches and Switch Fuse Units*
   - (i) Drum type Load Break Switches and Switch Fuse Units. Range : 15, 40, 60 and 100 amps.
   - (ii) Load Break Switches and Switch Fuse Units. Range : 200, 400 and 600 amps.
7. *Miscellaneous products*
   - (i) Push-Button Stations.
   - (ii) Time Delay Relays.
   - (iii) Overload Relays.
   - (iv) Magnetic Lubricators.
   - (v) Specialised Power Control Equipment.

Jyoti Research Laboratory

Progress in the product development would be virtually impossible without adequate facilities to evolve, try out and establish certain assumptions, hypotheses, theories and date as conceived by the designer. With this aspect in view Jyoti has decided to set up a full-fledged self-equipped Research and Development Centre close by the Works-the first Indian institute of its kind in the private engineering sector. With the establishment of this extremely useful limb of the organization, a long felt need for facilities to carry out research and development on hydraulic and electrical products will be satisfied. This centre will work simultaneously on the design, proto-type making and testing of proto types and new models.

This in short is the Jyoti story so far. Notwithstanding its impressive record of achievements, Jyoti's quest for still greater engineering heights still continues unabated. In time to come, it proposes to place on market highly useful products like stator rotor starters, cast-resin insulated H.T. current and potential transformers, cam-type switches etc. ***

Toshniwal Bros. Ltd.

They are a leading firm of Bombay, importing all types of Scientific instruments and laboratory test equipments in collaboration with Hartmann and Braun of Frankfurt, Germany. They propose to set up Rs. 65 lakh plant in Ajmer (Rajasthan) for manufacturing annually about Rs. 60/- lakhs worth of industrial process control and test equipment.

The proposed plant will be the first of its kind for large scale production with possibilities of further expansion. Industrial licence has been obtained from the Government of India and land has been acquired for setting up the factory which is expected to be completed within the next six months. Part of the production is expected to be marketed by the end of 1961.

Mr. Wilfried Braun, President of Hartmann and Braun and his two associates Dr. H. Voller and Mr. H. Maul are currently in Bombay to finalise details with their Indian counterpart. The foreign collaborators will supply technical know-how and will train the requisite personnel both in India and Germany.

The foreign exchange required for the proposed plant will be about Rs. 22 lakhs. The Company is allowed to export its products to neighbouring countries like Burma, Ceylon, Pakistan and Nepal. The equipment to be produced are mainly used by Paper, Chemical, Plastics and Iron and Steel Industries.

According to Dr. G. R. Toshniwal, Managing Director of the company, the visitors are likely to meet the Commerce and Industry Minister in New Delhi and visit major industrial centres here in India to explore the possibilities of setting up other joint ventures. The Company is likely to enter the market to raise capital to finance the new project. ***

Bharat Electronics Limited

Bharat Electronics Limited was established by the Government of India in the year 1954 with a view to make the country self-sufficient in electronic equipment for which the Country until recently was completely dependent on foreign countries. Since its inception in 1954, the factory has been making steady and rapid progress in the production of electronic equipment for the Defence Services, Government Organisations, Educational and Research Institutions etc. The actual production of electronic equipment started in 1955 with only *two items* viz. General Purpose Communication receiver and Medium Power 400 Watt Transmitter. Since, then, the number of equipment in production has been gradually increased and today there are as many as *22 different* types of equipment like receivers, transmitters, transreceivers on the production line. While large number of the types caters to the needs of Civilian and Government Departments, about half a dozen are for the Defence Services. We have plans to furthei diversify the equipment and produce more different types of equipment for Defence Services. In the next two or three years, the types of equipment produced in the Factory are expected to number over *40* which will cater to a larger extent the needs of Defence Services, Civil Aviation, Railways, AIR etc. The production will include Broadcast Transmitters, Tape Recorders, VHF Multichannel equipments, Air borne VHF equipment etc.

The production of the factory has been steadily growing from approximately Rs.5 lakhs worth of equipment in 1956-57 to approximately Rs.170 lakhs this year. When the plan for the manufacture of Radar equipment materialises in the near future, the production figures will leap to approximately Rs. 4.5 crores.

While in the initial stages, there is an unavoidable factor of dependence on the foreign sources for the manufacture of the different equipment, this factor is being minimised rapidly. In fact, in some equipments, the indigenous contents are as much as 75%.

Because of the rapid indigenisation in the fields of components, testing etc. there has been a considerable foreign exchange saving for the country. So far, the total production of the factory has been approximately Rs. 380 lakhs worth of equipment and the foreign exchange saving to the tune of above Rs. 220 lakhs has been achieved. The demand for the electronic equipment from the Defence Services, Government Departments, Educational and Research Institutions etc. will largely be met from BEL's production in the very near future. This will not

only reduce the dependence on foreign sources to the barest minimum but also save considerable amount of foreign exchange to the Country, besides imparting confidence that we can produce any type of complicated electronic equipment.

While the production of electronic equipment has been the principal objective of the factory, the need for production of electronic components has not been overlooked. In this direction we are already producing radio receiving valves, ceramic and mica capacitors, transformers and coils and the piezo electric crystals. Plans are also afoot for the production of transistors in the factory.

While of necessity we have to seek the technical collaboration of foreign manufacturers for the production of complicated electronic equipment, the necessity for developing an indigenous unit in the factory for designing and producing electronic equipment to meet the very special requirements of the country has been receiving the attention of the factory. As a step towards achieving this, there is a Research and Development Department in the factory which has already to its credit development of electronic equipments like single, twin and ten channel equipment for ground to air communication. Also the department has developed transistorised community receivers, cheap domestic receivers, hearing aids and the like for meeting the common market demand. It has thus established a healthy system of working and is expected to grow rapidly, making more and better contribution towards the development of electronic equipment for different users in the country.

The Factory since its inception has organised itself not only to achieve and maintain quality of the equipment but also to keep the price-level on a competitive basis with similar equipments produced elsewhere in the World. In fact, in certain types of equipment, a price reduction of as much as 20% has been effected over the prices which prevailed about three years ago.

The year 1959-60 has been significant in the history of BEL from the commercial point of view. For the first time during this year, the Company made a profit of approximately Rs. 7 lakhs and we hope that the current year's profit would be greater.

The equipment produced in this factory include: BELWIN Transmitter for upper air observations—General Purpose Communication Receiver—25 Watt H.F. Transreceiver intended for use as a central station in mobile radio network or for setting up point to point communication between mobile units—VHF Manpack set—a light-weight set for short range radio telephone communication. This can be carried by hand or strapped on the back or chest—20 Watt VHF mobile Transreceiver designed for medium range communication between mobile stations or between mobile and fixed stations working in a VHF network—50 watt VHF Transreceiver for static operation as a control station in a VHF radio telephone network—Twin Channel Transreceiver designed to provide air to ground communication primarily for use in aircrafts—Single Channel Transreceiver-emergency stand-by for the above—Ten Channel Transreceivers—Medium Power (400 Watt) HF Communication transmitter for A1, A2, and A3 modes—Remote operation facility provided. A1, A2, A3, A3a, F1, F4 and F6—5KW version of the above—20KW Independent Side Band Transmitter—Independent Side Band Receiver—High Quality Broadcast Studio equipment like monitoring amplifiers, preamplifiers, General Purpose amplifiers, Consoles—VHF Multichannel equipment—Measuring Instruments like Audio Oscillators, Vaccum tube voltmeters etc—Hearing Aids—Transistorised Megaphone called BELHALER—Battery Chargers Power Supply Units.

Besides the above, the factory will shortly take up the manufacture of high fidelity Tape Recorders—Consoles and Portable types as well as Play-back decks—and broadcast transmitters. Manufacture of some electro-medical instruments and transistors is also being planned.

In the field of electronic equipments, BEL manufactures radio receiving valves, ceramic and mica capacitors, piezo electric crystals, coils, transformers, chokes etc. BEL can undertake not only to work but schemes in connection with the radio telephone net-work for any special needs of the customer but also can conduct extensive survey to study the actual propagation conditions and to suggest the right types of equipment for most efficient, reliable and economical operation in the network. Installation of equipment can also be undertaken by BEL if required.

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B.O.A.C.'s 21st Year in Aviation

Twenty-one years after its formation in April, 1940, by the merger of Imperial Airways and British Airways, B. O. A. C. is now the second largest international airline in the world in terms of ton/miles carried and seat/miles produced, and is expanding rapidly.

Today B. O. A. C. operates a fleet of 65 jet-powered airliners and ten piston-engined aircraft made up of 15 Rolls Royce 707s, 19 Comet 4s, 31 Britannias, 8 DC. 7Cs (now used for charters) and 2 DC. 7F freighters.

This fleet operates to six continents over a route network of 419,000 miles and offers on overall capacity of 880 million ton miles for the year ending 31st March, 1962.

But this is only part of the picture. In addition to its partnership arrangements with S. A. A., E. A. A. and C. A. A., B. O. A. C. is also linked by revenue pools with Trans-Canada Air Lines, Qantas Empire Airways, Air-India International, Nigerial Airways and Ghana Airways, and is associated with a number of other airlines which feed passengers on to the long-haul services.

The result is a matchless choice of services and aircraft for the travelling public.

Apart from its role as a commercial airline, B.O.A.C. also acts as an unofficial ambassador of Britain and as an unofficial publicity force for the British aircraft industry—its operation of Britannia and Comet airliners for example has undoubtedly assisted in selling these aircraft to other airlines.

In Africa these 21 years of B.O.A.C. have been crowded with achievement from the setting up of the Horseshoe Route from Durban to India and Australia during the war, to the opening of the world's commercial jetliner service—between London and Johannesburg in 1952, to the operation of a daily jet service on this route from April this year.

The next 21 years are likely to be even more eventful as the speed, scope and sheer bulk of air travel continue to gather pace in snowball fashion. Civil aviation at the moment is still only pecking at its potentialities.

Twenty-one years from now, one can expect many of those potentialities to have been realised. The speed of supersonic travel will virtually have eliminated the time factor in travel—it will probably be quicker to cross the Atlantic than to cross London. Improved aircraft design and higher incomes should have made air travel a matter of course for the mass of the public in many countries with the expansion in air freight business.

But in the more immediate future, B.O.A.C.'s order of 45 rear engined Vickers VC.10 will enhance B.O.A.C.'s reputation throughout the six continents they operate.

To serve air travellers, B.O.A.C. have 37 flights weekly out of India, east and west bound. With their Offices situated at Bombay, Delhi, Calcutta, Cochin and Madras, one can obtain all information and expert advice from the efficient staff provided to meet the requirements of the travelling public. ***

The Paper Products Limited

The Company have entered into a Technical Know-How Consultancy Agreement with Messrs. Milprint Overseas Corporation, Milwaukee-1, Wisconsin (U.S.A.) who are considered to be the largest manufacturers and convertors of Flexible Packaging Materials in the United States.

Under this Technical Collaboration they would be obtaining from their Associates all informations, knowledge and Technical Know-How of Packaging Materials made from Cellulose Films, Pliofilm, Polyethylene, Saran, Aluminium Foil, Glassine and Waxed Paper and combinations and laminations thereof and other types of papers and films presently known and subsequently to be developed.

The company would be receiving all the benefits of their collaborators' past and future experience and Technical Know-How and developments of products and machinery and other connected materials.

With their own experience of 27 years in this field and with the latest Technical Knowledge at their disposal under this agreement they would be still better equipped to provide most modern packaging materials incorporating the latest technical developments and thus serve all better.

Should any have any Packaging Problems please do not hesitate to contact them. They and their Associates would be only too pleased to render all assistance and guidance.

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Madras Rubber Factory

Founded in the year 1946 by the late Mr. K. C. Mammen Mappillai, Madras Rubber Factory, Madras, has grown to be, today, one of India's leading Rubber Factories and bears the added distinction of being the largest manufacturer of Tread Rubber Compound (Camelback) in this country.

The factory is located in the heart of Madras City's rapidly expanding Industrial area and is manned by a team of trained and experienced chemists, engineers, and rubber technologists. A well equipped laboratory, with every modern testing and research apparatus, keeps the quality of M. R. F. Tread Rubber Compound at a consistently high level. M. R. F. products have established an unshakeable reputation not only in India, but in 14 neighbouring countries as well. Over the years, production has been steadily stepped up to the present high level, in order to meet the increasing demands for these vital products, so essential to the nation's progress-especially in view of the present acute shortage of tyres of all types.

Madras Rubber Factory, now a public limited concern, has been fortunate to secure the collaboration of one of the leading International tyre manufacturing companies of America: Mansfield Tyre & Rubber Company, U. S. A. They will soon manufacture heavy truck, bus, car, delivery van and motor cycle tyres and tubes in India. Mansfield Tyre & Rubber Company, U. S. A., was established in 1912 and is today one of the oldest and most respected tyre manufacturers in America. Their main factory at Mansfield, Ohio, has a capacity to produce 14,000 tyres per day more than double the total production of tyres in India per day today. They will station their experienced staff of expert technicians in India till the new, modern tyre factory of M. R. F. is erected and begins production of Mansfield Tyres. Madras Rubber Factory Ltd, have also the permission of the U. S. collaborators to export Indian made Mansfield Tyres to every country in the world except to the U. S. A. and Canada. Mr. James H. Hoffman, President of the Mansfield Tyre & Rubber Company, is one of the Directors of M. R. F. He visited India during November 1961 to inspect the progress of work on the new Project and to suggest any improvements and alterations to the present arrangements.

The present installed capacity of all tyre factories in India, including the expected production of those factories which will come into existence during the next 2 or 3 years, totals only 2.5 million tyres. This figure should actually read at about 2 million tyres, since factories rarely operate at more than 80% of effective capacity.

It is expected that, by the end of the Third Five Year Plan, the demand for tyres in India will reach the astronomical figure of 4.5 million, which means that there will be a substantial gap between the supply and need. This gap must be narrowed down as much as possible.

The first Indian-made Mansfield Tyre will roll off the production lines early in 1962. The annual production of all types of tyres will be in the nature of about 300,000; that is, O.3 million, approximately 7% of the total expected shortfall of nearly 2 million tyres. Nevertheless, it will be one of the largest among the new factories that have been licensed and, with gradual stepping-up of production from time to time, it is expected that the new factory will go a long way towards meeting the demands for tyres in India.

The Mansfield Tyre has established a fine reputation for iteslf in America. The Indian-made Mansfield Tyre will be designed for Indian conditions and will be equal or superior, in every way, to any other tyre at present on the Indian market. Tyre dealers, motor vehicle owners and transport operators in this counntry have enthusiastically welcomed the establishment of this new tyre factory.

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Alitalia in India

It was not so very long ago that Alitalia, the national airline of Italy, started operations in the east. In March 1959, to be exact, the first DC-7C landed at Santa Cruz airport in Bombay on its inaugural flight, to create a living link between two of the world's most ancient civilizations through the most modern means of transport.

Background

Although a newcomer in India, Alitalia was not new to aviation. In fact it grew out of one of the world's pioneer air organizations which had started operations as long ago as 1926. At the end of World War II Alitalia reorganized its company and officially resumed operations in 1947. One of the first management policies was to build a solid foundation and weld a strong organization in Italy, Europe, the Middle East and North Africa, before entering the highly competitive intercontinental routes across to North and South America, South Africa, the Orient and Australia. This attitude has paid dividends, for today Alitalia ranks tenth in the world among international airlines.

Commercial Pool

Another policy was a continuous effort to be in a position to offer the best in airline service to passengers. This resulted in Alitalia forming a commercial pool in the east in January 1960 with three other leading European airlines, Air France, Lufthansa and T.A.I. This meant that Alitalia could offer air travellers from India a choice of 400 destinations, with frequent services, convenient connections, and a world-wide network.

New Office in Bombay

In April 1960, shortly after Alitalia celebrated its first anniversary in India, the new Bombay office was inaugurated. Its highly individual frontage has already become a landmark in the city. Planned and designed on the most modern lines it offers passengers speedy and efficient ticket and air terminal facilities which are the most up-to-date in Asia.

Jets Go into Service

The midsummer of 1960 marked the great changeover to the jet age. Super DC-8 Jets, powered by four Rolls-Royce engines, were introduced on the Atlantic run. At the same time, twin-engine Caravelle jets were put into service on the European, Middle Eastern and North African routes. This not only cut down flying time but greatly increased passenger-carrying capacity. As the official airline for the Olympic Games, Alitalia helped to transport many thousands of people, and before the year was out,

during November 1960, had clocked up its millionth passenger.

Serving the South

In India, towards the end of the year, in November 1960, a new office was opened in Madras, so that people living in South India could enjoy

the latest in service facilities. In May 1961, these facilities were extended to the residents of Ceylon with the opening of the Colombo office.

Bombay on Jet Route

Bombay became part of Alitalia's all-jet network on 15th June 1961, when the first Super DC-8 Jet ever to land in the city touched down at Santa Cruz airport, on the inaugural flight from Rome to Sydney via Teheran, Karachi, Bombay, Bangkok and Pnom Penh. Other route extensions have been planned to Scandinavia, Japan, and eventually round the world.

The Story in Numbers

During the past few years, Alitalia has been continually increasing and modernizing its fleet to accommodate its rapidly expanding traffic, extensions of routes, and conversion to all-jet schedules. At the present time the fleet totals 50 and includes six DC-8s (with four more on order), nine Caravelles (with five more to come), three DC-7Cs, two DC-7Fs (all cargo transports), three DC-6s, five DC-6Bs, 14 Viscounts, four Convairs, and four DC-3s (for short hop in Italy). The Alitalia fleet covers a network of nearly 94,000 miles, linking 69 cities in 40 countries scattered across six continents, with more than 6,000 employees.

Service—Italian Style

If an airline can be thought of as having a "personality", then Alitalia's would surely be Italian in every respect. Feeling that a national airline should preserve as much as possible of the character of the country it serves, Alitalia stresses its association with Italy in all spheres of its operations. From inflight meals, to the interior decoration of aircraft and ticket offices, to the image created in its advertising, Alitalia directs itself to a public with an appreciation for Italy and things Italian—a public which is growing every day.

Looking Ahead

A large measure of Alitalia's success is due to experienced and forward-looking leaders, sound management policies, and a vast organization of dedicated workers who strongly identify themselves with their company and who take pride in having helped build it. Although it has become a large, efficient, and full automated organization, its approach is still that of a company small enough to provide a personal touch to its passengers. With the jet age now a matter of routine, Alitalia looks ahead and is already planning for the era of supersonic transport.

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Metal Box Company

Metal Box started operating in India in 1933 when it introduced for the first time high quality lithographed branding on tinplate and modern pilferproofing methods—two packaging techniques that helped to provide a major stimulus to the manufacture and marketing of packaged consumer goods. As pioneers in the development of scientific containers and closures, tailor-made for Indian conditions, Metal Box has created a market for quality packages. Today, the Company shares the fruits of this expansion with 106 tin-box makers and 35 packers who manufacture their own containers. No more than 20% of India's tin-container requirements is met by Metal Box.

The packaging industry has seen very rapid expansion since 1933. Yet with the recent advent of new thermoplastic and laminated materials past progress may be dwarfed by the development that the future promises.

The issued capital of The Metal Box Company of India Ltd. is Rs. 191 lakhs of which the Indian public owns approximately 46% (including 13% held by the Life Insurance Corporation).

Metal Box earned approximately Rs. 970 lakhs from the sale of its products last year.

Metal Box employs nearly 7,000 people of whom only 27 are non-Indians. Metal Box is managed by 123 executives of whom 96 are Indians. Metal Box introduced in India 28 years ago high quality pilferproof packaging and printing on tinplate as well as the indelible printing of trade marks and brand names on containers.

Experience has proved that pilferproof packaging and lithographed branding are the surest ways of defeating the unscrupulous racketeer trafficking in spurious drugs and adulterated food-stuffs. Retailing in small consumer packages, sealed at the factory, is the only means whereby the innocent and often illiterate customer can be sure of the purity of the product he buys.

Today Metal Box supplies containers and closures to 1,400 packers who pack over Rs. 100 crores worth of goods and employ over 80,000 persons.

Metal Box was the first to introduce the manufacture of almost every new type of metal container or closure in India. This lead stimulated competition. Today Metal Box shares the market for all these products with later entrants.

Exports of Indian products in metal containers have been made possible by the first class finishes and protective lacquers developed with the assistance of the Metal Box Research Division. In 1960–61 over Rs. 4 crores worth of goods — cashewnuts, fish, vanaspati, vegetable oils, fruit, toiletries, confectionery and biscuits—were sold abroad in Metal Box packages specially designed to meet the needs and tastes of overseas markets. One maker of toiletries alone has been able to sell against stiff foreign competition in 14 different countries with his product protected and dramatised in a lithographed Metal Box container.

The increase in direct exports of Metal Box products has been spectacular—over twelve times in three years and a further anticipated 66% increase during the coming year.

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The Premier Automobiles Ltd., Bombay

Speech of The Chairman, Shri Lalchand Hirachand

The following is the speech delivered by Shri Lalchand Hirachand, Chairman at the Seventeenth Annual General Meeting of the Company held on Friday, the 22nd December, 1961 at 4 p.m. (I.S.T.)

Ladies and Gentlemen :

I am very happy to extend a warm welcome to you all, on the occasion of the Seventeenth Annual General Meeting of the Company.

The Directors' Report and the Statement of Accounts for the year ending on the 30th June, 1961, have been in your hands for over a month and I hope you have given due consideration to the same.

During the year under review, the Company's turnover increased to Rs. 22,73,86,000 as compared to the last year's turnover of Rs. 20,94,87,000. 6,913 cars and 6,073 trucks were sold during the year.

The working of the Company for the year under report resulted in a profit of Rs. 60,59,495 after providing Rs. 56,44,279 for depreciation, Rs. 13,00,000 for development rebate and Rs. 55,00,000 for taxation. Adding to this, the balance of Rs. 3,21,332, being the amount of previous year's "carry forward" (after adjusting the amount of dividend paid on forfeited shares now annulled) and the net surplus of excess provisions, income and claims received in respect of previous years Rs. 77,292, the amount available for distribution comes to Rs. 64,58,119. Out of this your Directors have made the following appropriations :—

To contingency reserve	Rs. 10,00,000
To Dividend on equity shares at Rs. 9 per share (subject to tax)	Rs. 49,82,540
Balance to be carried forward	Rs. 4,75,579

This year's turnover shows an increase of Rs. 1,78,99,000 over previous year's. In the same way the current year's profit shows an increase of Rs. 18,40,656 over last year's. This has naturally enabled us to maintain the dividend on increased capital.

The progress made in the manufacture of components of motor vehicles by the Company has already been dealt with in the Directors' Report. I shall therefore only briefly summarise the position as follows :—

The Fiat transmission including gears is being manufactured in the factory.

The manufacture of axles for the Fiat car is also satisfactorily progressing. The machining of the items like Brake Drums, Hubs, Ring Gears, Pinion and Axle Shaft has been completed and the assembly of the axles has already commenced. In a short time they will be used on the vehicles.

The progress on the manufacture of front and rear axles for trucks has been steady.

As stated in the Directors' Report, an Agreement in connection with the loan of 7,200,000 dollars from the Development Loan Fund of the U.S.A. has been executed. The aforesaid Agreement was signed on the 21st August 1961 in New Delhi by Mr. John Kenneth Galbraith, U.S. Ambassador, on behalf of the U.S. Government and by me on behalf of the Company. A small ceremony was held in the U.S. Embassy in New Delhi on that day which was attended by several officials of the Indian Government and senior officers of The Premier Automobiles Ltd.

While signing the Agreement, Mr. John Galbraith said that this was the first Agreement he had signed for the private sector, since he became Ambassador and further observed :

"There is nothing that is going to be more needed in the course of the Third Five-Year Plan than improved transportation, including improved road transportation. You (Premier Automobiles) are playing a very important and critical role in the provision of facilities necessary for this purpose. We have very high confidence in Premier Automobiles and it is our conviction that you will continue to do a very good job that you will produce good automobiles, get them out in time and for a low price. This I am happy to note, is your intention and I wish you good luck."

While thanking the D.L.F. for this assistance I made a reply suited to the occasion as follows :

"The initial success has been there. We have made considerable progress during the first two Plans, and it is our keen desire that the work should be carried on with greater enthusiasm, so that progress towards the objective, for which the Government of India are working and for which people in Commerce and Industry are co-operating with the Government, may be accelerated. We greatly appreciate the assistance that we are getting from the American Government in the form of this loan. It is particularly a happy augury that direct help is being given to the private sector. In this country, the private sector is playing a very important role in economic development, and I am sure that this assistance will will help us to rebuild our nation for the betterment of all. The DLF loan to Premier Automobiles will finance foreign exchange costs of importing machinery to produce components for Dodge and Fargo trucks and Fiat cars, and to modernise and expand capacity of other portions of the company's factory. The expansion project made possible by the loan is expected to enable India to save more than 2 million dollars per year in foreign exchange, now spent in importing sheet metal components. Premier's output will be increased from 12,000 trucks and cars per year to 21,000 units"

We are awaiting sanction for our application for a further loan of 3,000,000 dollars made to the D.L.F. for the purchase of dies for the Sheet Metal components for the Fiat cars.

I place on record our thanks to the Bank of Baroda Ltd. for giving Guarantee in favour of the D.L.F. on the 26th September, 1961, in respect of the loan of $7,200,000. The Bank of Baroda has also been good enough to agree to give the Guarantee for the additional loan of 3,000,000 dollars.

The subject of expansion has been engaging the attention of the Government of India for some time. Subsequent to the meeting held by the Minister for Industries in January 1961 in Delhi acute shortage of foreign exchange has developed and the Government have had to reassess the position. The thinking that was indicated in the meeting held in January was that so far as commercial vehicles were concerned each commercial vehicle manufacturer could increase the production to such capacity which he thought the market would accept. Freedom with regard to models and loading capacity was also given to the manufacturer. While the latter factors have not changed, the Government find it necessary to restrict the expansion in production capacity as there is not enough foreign exchange to meet the requirements of the manufacturers. Your company have been allowed to expand the production of commercial vehicles to 7,500 on the basis of single shift working. We are also offered foreign exchange for the manufacture of the diesel engine. The total allocation therefore is as follows:

(1) 7.2 million dollars for the sheet metal equipment, expansion of Tool Room and removing of certain bottlenecks in the present capacity.

(2) Additional 3 million dollars for obtaining dies for the sheet metal parts particularly of the Fiat car.

It is estimated that the machinery acquired with this money will enable us to increase our production of Fiat cars to 9,000 per year and of commercial vehicles to 9,000 per year in two shifts.

In addition to the above, we will be allowed:

(a) Foreign exchange to the extent of 5 crores of rupees and

(b) Additional 1.95 crores of rupees for purchasing machinery and equipment for forgings and castings.

For these two items negotiations will have to be made with the Agency for International Development, U.S.A., for a loan agreement. This money will be spent entirely in the United States of America.

(c) In addition one crore of rupees will be given in foreign exchange from soft currency area and particularly from U.K.

It is expected that with the utilisation of this foreign exchange our capacity to produce commercial vehicles will increase to 7,500 units on one shift basis or 15,000 vehicles on two shift basis.

As regards the expansion of car production the matter is still under Government's consideration and no decision has yet been taken.

In my last year's speech I had pointed out that it was not in the interest of the country for the public sector to take up the manufacture of an "economy car". Several representations from responsible quarters have since been made, urging the Government not to create new productive capacity either in the private or public sector unless it was in the general interest of the national economy. The Jha Committee had already made its recommendations on similar lines against the introduction of an economy car at this stage. The Development Council for Automobiles, Ancillary Industries and Transport Vehicles did not favour any allocation of foreign exchange being made for the production of a new car unless the priority claims of the existing Automobile manufacturers were fully met. The economy car is almost similar to the models currently produced. To profess, therefore, that such a model can be produced at a substantially lower price would be misleading. Our economy is based on high costs due to lower volume, less efficiency of labour, high prices of materials which have to be imported from abroad and the high taxation on local products. Unless, therefore, the whole system is changed it will only be a miracle if costs could be brought down so steeply as expected. It would be useful if the Government paused a while and considered how the foreign automobile concerns declined to undertake the manufacture of automobiles on the ground of uneconomical production and therefore decided to close down their shops which were giving handsome profits. They had the experience, the know-how and all the resources; so their decision to close down becomes significant in the context of the optimistic expectations of such low costs of the economy car. The recommendations of the French manufacturers are full of "ifs" and "buts". I would, therefore, appeal to the Minister of Industry to weigh the pros and cons of the problem more rationally before taking decision in the matter.

In the year 1961, the sales of vehicles have been very much similar to the sales in 1960. In the commercial vehicles, however, there has been a little set-back in the demand. This is partly due to the proposed legislation on Hire Purchase. Under this legislation the present right of the financiers to take possession of the product, if stipulated instalments are not paid, has been subjected to considerable restrictions. This has created a scare and the Banks as well as financing organisations have restricted their financing operations. As is well known, the commercial vehicles are primarily sold on Hire Purchase basis. If, therefore, Hire Purchase operations are restricted, it has its effect on the demand for commercial vehicles. Secondly, the heavy taxation, particularly the heavy excise duties that were levied last year, is showing its effect gradually. The tight money market also has contributed to the fall in demand. The big waiting lists have shrunk and the commercial vehicles are now available practically on demand, even in the case of popular makes. How long this situation will continue, it is difficult to say. Let us hope that with the rising tempo of production in the Third Five-Year Plan, the need for transport facilities grows rapidly and in consequence the demand for commercial vehicles also goes up.

The Third Five-Year Plan envisages an increase in vehicle production to the extent of doubling the present capacity. Under the Second Five-Year Plan, the automobiles production target was established at 60,000 units. For one reason or the other, this could not be reached and the maximum production came to 52,000 vehicles. In the Third Five-Year

Plan, the target is fixed at 1,00,000 vehicles and the Government have already started taking steps to enable the manufacturers to expand their production. Hitherto, the Government have only considered the expansion of commercial vehicles, while the expansion of cars is still under consideration. I hope that expansion of the cars programme also will be given effect to before long. It is expected that more than 45 crores of rupees will be spent for the expansion programmes during the Third Five-Year Plan.

For the purpose of improving our relations with labour, we have entered into two Agreements with the Premier Automobile Employees Union. By one Agreement, wage structure was revised, which is expected to give the workmen and annual additional income of nine lakhs of rupees. Under this Agreement, it can be safely said that we offer the best terms in the Automobile Industry.

The second Aggreement covers the question of Bonus for the financial year 1959-60. The total amount approximating to Rs. 23 lakhs would be distributed as Bonus to all our employees. The share of the workmen, under this Agreement, whose earnings are below Rs. 500 per month, comes to nearly Rs. 21 lakhs. All these terms were offered to Engineering Mazdoor Sabha, who have rejected them, if I may say so, very unwisely.

The subject of wages reclassification, etc., was referred to a Conciliation Board, of which the late Justice Bavdekar was the Chairman. The Court held elaborate deliberations and I understand, were about to sign the report. Unfortunately, the sudden death of Justice Bavdekar left the work incomplete. The Government have now appointed Shri Jeejibhoy to be the Chairman of this Board and it is hoped that the Board will soon conclude their deliberations and submit their report to the Government.

While we are making progress with regard to the manufacture of parts and components, we are also making experiments and research with regard to design and other engineering problems. It was observed that some of our commercial vehicles have shown certain defects in the special conditions existing in this country. Our staff have redesigned some of the parts which will make the commercial vehicles more popular. A constant effort is being made to improve the methods of production and also improve the design, to make vehicles more popular.

In last year's speech I had mentioned that as a result of the Government's policy with regard to automobile manufacture, which was announced last year, the Company will have the right to manufacture the Meadows Engine. The Agreement with Automobile Products of India Ltd., for the taking over of the manufacture of Meadows Engine by the Company was executed on 29th April 1961. In pursuance of this Agreement, out of the sum of Rs. 24 lacs, the Company has paid Rs. 15 lacs to API having negotiated with the Government of India and agreed to cancellation of the Licence dated the 9th December 1955 issued to them for the manufacture of Meadows Engines and of API having negotiated with Meadows for the termination by mutual consent of the licence granted by Meadows to API under an Agreement dated the 16th March 1956. The balance of Rs. 9 lacs is payable in two instalments of Rs. 3 lacs and Rs. 6 lacs, at the expiration of 12 months and 24 months respectively from the date of the Agreement.

The production of Meadows Engines has begun but it will take some time more before we can attain the full production as we have yet to import a number of machine tools required for the purpose.

In consequence of the transfer of diesel engine licence in favour of Premier we have negotiated a fresh agreement with Henry Medows Ltd., whereby Premier have obtained slightly favourable terms particularly regarding payment of royalty which has been substantially reduced.

As stated in the Directors' Report the Company had made an application for the issue of further equity capital of the value of Rs. 2 crores in shares of Rs. 100/- each, to meet the rupee expenditure that will be needed for the purchase of land, building, etc., in connection with our sheet metal project. In addition, balance of Rs. 40,40,000 remained to be issued out of capital sanctioned by an earlier order of the Controller of Capital Issues.

The Controller of Capital Issues has now accorded his sanction for the issue by the Company of further 2,40,400 equity shares of Rs. 100/- each for cash at a premium of Rs. 10/- per share.

As stated in the Directors' Report the Company has selected a suitable land admeasuring about 300 acres on the Kalyan-Shill Road, near Kalyan for the new factory site. An Agreement with the Government of Maharashtra was executed on the 12th December 1961 in respect of the acquisition of this land. We expect to obtain actual possession of the land in a short time.

The construction work of the factory building at Kalyan has been entrusted to Messrs. Hindustan Construction Co. Ltd., the well known and reputed firm of constructional contractors in the country.

The existing Agreement of the Company with Chrysler Corporation had to be revised to bring it in conformity with the present day conditions. The modified Agreement has received the approval of the Government of India and will be valid upto 31st December 1966.

Under the provisions of this Agreement the Company has to pay to Chrysler Corporation in consideration of the manufacturing assistance and other benefits granted by the Corporation to the Company the following fee :

(1) when the total amount paid to Chrysler for a vehicle or components is more than 50% of the Chrysler ex-factory dealer net price ; 1% of the value of that portion of complete vehicle not purchased from Chrysler.

(2) When the total amount paid to Chrysler as aforesaid is less than 50% of the Chrysler ex-factory dealer net price : $1\frac{1}{2}$% of the value of that portion of a complete vehicle not purchased from Chrysler.

The above scales of fee is applicable upto the production figure of 15,000 vehicles per year and thereafter the fee will be open to further negotiation between the parties.

I am glad to inform you that the agreement with the Fiat S.P.A. which was valid upto 12th September 1961 has been renewed for a further period of five years from 1st July 1961 and it has also received the approval of the Govt. of India.

Under the new agreement we have to pay to Fiat in addition to the payment for technical know-how etc. a fee of 2½% on £ 300 (being the agreed value of a CKD set ex-factory) on each unit manufactured and sold by the Company upto 7,000 units manufactured per year and this fee will be reduced to 1.5% on each unit manufactured and sold by the Company beyond 7,000 units every year.

Under the new agreement we have to pay to Fiat in addition to the payment for technical know how etc., a fee of 2½% on £300 (being the agreed value of a CKD set ex-factory) on each unit manufactured and sold by the Company upto 7,000 units manufactured per year and this fee will be reduced to 1.5% on each unit manufactured and sold by the Company beyond 7,000 units every year.

Out of 1,60,000 debentures issued in the year 1958, 1,57,462 debentures have been converted into 'A' Ordy, shares as on 8th December, 1961, leaving a balance of 2538 still outstanding. By a special resolution passed in the meeting of the debenture-holders held on 2nd June, 1961 the debenture-holders have accepted bank guarantee as security in place of lien which the debentures has on the fixed assets of the Company.

For your information I may give the production figures for the five months ending on the 30th November, 1961 and they are as follows:

The Company produced 3014 cars and 1,920 trucks and sold spare parts of the value of Rs. 67,06,938 during the five months ended on the 30th November 1961 as against 2,730 cars and 2,525 trucks and spare parts of the value of Rs. 64,01,413 sold in the corresponding period of the previous year.

A fire broke out in our Factory on the night of 21st May 1961, which completely destroyed the Trim Application Dept., Trim Store and the Assembly Plant Office. As this day happened to be a weekly holiday for our workmen, there was no loss or injury to human life; the damage was confined to the materials of the approximate value of seven lacs of rupees. This damage was fully covered by insurance.

The business of the Premier Auto Electric Ltd., a subsidiary was satisfactory. This Company took up the distributorship of more indigenous products, namely automobile dash board instruments in Northern and Western India and Dagenite batteries in the State of Maharashtra and West Bengal.

The other subsidiary Company the India Steering Gears Ltd. could not start business this year also due to non-availability of a licence.

The financial statements of both the companies have been published along with the financial statement of your Company.

The position regarding taxation is as follows:

The Income-Tax assessments of the Company are completed upto the end of the financial year 30th June 1955.

The assessments of the Company as agents of Chrysler Corporation have also been completed upto 30th June 1960. The Company's application to the Tribunal for referring our case to the High Court is still pending.

The assessments of the Company as agents of Fiat Corporation have been completed upto the financial year 30th June 1960.

In addition to the donation of Rs. 25,000 to the Poona Flood Relief Fund and Rs. 10,000 for relief work at Poona mentioned in the Directors' Report, the Company has sanctioned a donation of Rs. 90,000 to the Election Fund of the Congress Party and Rs. 60,000 to the Election Fund of the Swatantra Party.

I shall now deal with some of the welfare activities in our works.

The Company has always been encouraging acitivities in the realm of sports. Members of our staff participate in Times of India Cricket Shield, Football, Hockey, Hu-tu-tu, and Badminton tournaments in the City.

Adult education classes in Kannada are held in the colony under the auspices of the Bombay City Social Education Committee for such of the employees who desire to take advantage of the same.

There is also a Bal-Mandir Primary School (run with the aid of management) having over 300 children. The Workers' Education Classes conducted by workers-teachers trained under the Government of India Workers' Education Scheme have been recently started and about 35 worker students attend this class.

I extend an invitation to all the shareholders to visit our factory this year also. To facilitate the visit, Saturday, 13th January 1962 has been selected and those of you who would wish to visit the factory are requested to register their names at the Head Office of the Company so that necessary transport can be arranged.

Before concluding I take this opportunity to offer thanks to the staff and workers for their co-operation and the good work put in by them during the year under review.

And now I beg to move:

"That the Directors' Report and Audited Balance Sheet as on the 30th June 1961 and Profit and Loss Account for the year ended on the 30th June 1961 be and they are hereby approved and adopted".

N.B.—This does not purport to be a report of the Proceeding of the Annual General Meeting. ***

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